ROADS And STREETS
Vol. 79, No. 8 August, 1936
A GILLETTE PUBLICATION
ESTABLISHED 1906

Plant-Mixed STABILIZED CONSTRUCTION in Illinois

By JOHN C. BLACK
Field Editor, Roads and Streets

THE second plant-mixed stabilized road surface in Illinois is now under construction in Boone County between Belvidere and Genoa. The first, a 5.65-mile stretch in Henderson County between Dallas City and Lomax—was completed by the state early in July and the plant moved to the present work.

The development of this type of surface will be watched with interest and carefully compared with other low-cost types. Possibilities of the material as a base for black-top and concrete are also to be considered.

The Boone County job consists of 5.2 miles of 3 in. surface 20 ft. wide laid on an old gravel road as base.

Base Partly Compacted by Multiple-Wheel Roller.

The material is a combination of approximately one part clay with ten parts sand and gravel by weight, together with one pound calcium chloride per square yard of surface to be laid, all mixed in a pug mill and moinstened to produce proper plasticity and adhesion of clay to aggregate. A crown of 4 in. is maintained.

After the surface has been down for a period from 2 to 4 weeks, depending on the weather, it is sprinkled and an additional ½ pound calcium chloride per square yard is spread upon it.

Procedure on the Road

The old road is evened up to proper grade and crown with a blader, any low spots being filled with the gravel-sand-clay mixture without the calcium chloride. This material is also used to build up the base to at least 3 in. at points where the old metal has less than that thickness. It is then rolled with a multiple-wheeled, pneumatic tired roller until thoroughly compacted, a blader being used at intervals during the rolling to keep the surface true.

Following this preparation, the surface layer of stabilized material, including calcium chloride, is spread and rolled.

The material for both base and surface is hauled from the mixing plant to the road in measured batches and is dumped at points marked by stakes, the stake spacing being governed by the quantity of material required.

The amount of water used during the process, and the time interval between dumping and spreading, depend on the character of the materials and the weather. Some clays set up much faster than others. On the

Base Material on Road After One Trip Over with Grader.

present work the material is usually allowed to lie from one to two hours after dumping. In cooler weather it could lie for a somewhat longer period without setting.

Rolling follows as quickly as possible after spreading, unless the material is found to squeeze out from under the roller wheels, in which case rolling is postponed until sufficient set takes place.

The sprinkling before the final application of calcium chloride to the surface is usually from ⅓ to ½ gallon per sq. yd.

There is an average distance of 9.5 miles from gravel pit and mixing plant to the road under improvement. The clay pit is located beside the road at a distance of 5.8 miles from the plant. Twenty wet-batch trucks are engaged in hauling from plant to point of distribution. They are of 3 and 4 yard capacity, but only a 3 yard standard load is hauled, as the distribution of material on the road is proportioned by this measurement. On the return trip 4 trucks haul clay to the mixer.

The Mixing Plant and Its Operation

The central feature of the mixing plant is the pug mill. Aggregate is delivered to it by belt conveyor from a hopper at one side. Similarly, clay is delivered by a conveyor operating over the lower end of the mill. Both clay and aggregate receiving hoppers are surmounted by timber platforms from which the trucks dump their loads. Underneath each hopper is an adjustable feeder which delivers material to the belt at any desired rate. Materials are proportioned by weighing the load on a 10 ft. length of belt, and adjusting belt speeds to deliver proper quantities. Checks of this method indicate that it affords all necessary accuracy. On the present job the mixer receives 3468 lb. aggregate and 322 lb. clay (dry weight) per minute. To provide this, the gravel belt travels 221 ft. per minute, and the clay belt 163 ft. The same proportion of materials could be obtained with other belt speeds by varying the rate of feed to the belts. Before entering the pug mill the clay passes through a shredder which thoroughly pulverizes it. This shredder forms a part of the mill, and is located just below the operator's platform.

The clay belt is also used to deliver calcium chloride to the operator's platform, the chloride storage shed being located at the foot of the belt to facilitate the operation. Ten or more bags of the chloride (Dowflake) are carried to the platform at one time and stacked ready for use beside the hopper to the chloride feeder, which is automatic and adjustable for any desired rate of feed. One pound of chloride per square yard of 3 in. surface is being used on the present work.

The pug mill is 12 ft. long. The rate of mixing is controlled by changing the pitch of the blades. Different materials require different rates, but where materials are reasonably uniform, it is seldom necessary to make any adjustment during the progress of the job.

Gravel-Sand-Clay Base Ready for Surface Course.

General View of Mixing Plant. Mill in center, ramp to aggregate hopper at left, calcium chloride shed in left background, storage bin in right background, main power unit at right.

Mixing is begun with dry materials, water being added as needed during their progress through the mill. With the exceedingly dry material of the present season this is done at a point about half way through; when more moisture is present the water is applied later. About 64 lb. water per minute is used—that is, 64 lb. to each 322 lb. clay. After compaction on the road, the product (including water) weighs about 3850 lbs. per cu. yd.

Pug mill output is carried by belt to the storage bin, from which it is delivered directly to the trucks. Truck measurement is used, 2 men being employed to level the loads to the required 3 yards.

All of this equipment—mill, feeders, conveyors, and storage bin—is a product of the Pioneer Gravel Equipment Manufacturing Co. of Minneapolis. Power for the mill is supplied by a Caterpillar, 90 horsepower, truck-mounted gasoline motor, belt-connected, as shown in the picture. This unit was selected in preference to a diesel or other oil-burning engine because of its lower first cost; but in future installations, after power requirements have been more definitely established, it is probable that oil engines will be used.

The gravel conveyor is powered with a Le Roi engine mounted on the conveyor frame. The other 2 conveyors have power take-offs from the mill.

At the present time the plant is turning out about 720 cu. yd. of finished material per day—12 hours operation. It has a capacity, however, of 900 cu. yd. in that period.

The mill, clay hopper and feeder, and certain other portions of the plant are truck-mounted for ready movement and transportation.

Gravel, Sand and Clay

The aggregate is a pit-run product of sand and gravel with all pieces larger than 1 in. screened out. It is moved by truck from the large stock pile to the mixing plant—a distance of several hundred feet. Truck loading is by hand, which method is used in order to provide the maximum amount of employment.

Specifications are for the following grading:

Passing	Per Cent
1-in. Screen	100
¾-in. Screen	80-100
½-in. Screen	65-100
No. 4 Sieve	40- 70
No. 10 Sieve	50- 55
No. 40 Sieve	18- 35
No. 100 Sieve	12- 25
No. 200 Sieve	8- 18

The material runs from 25 to 30 per cent fines and from 4 to 5 per cent clay.

Clay in the pit is loosened by a grader and tractor outfit taken off the road, as needed. It is of a dark red color closely matching the color of the aggregate, and in this season is exceedingly dry and crumbly. Clay trucks

The Mill and Conveyors. Aggregate conveyor at right, clay conveyor at left with edge of calcium chloride shed just showing, finished-product conveyor leading to storage bin in left background.

are all loaded by hand shovel, about 6 men being engaged in the work.

Organization and Equipment

This is a Federal Aid job classified as "Works Progress Secondary," and carried out by the State with labor obtained through the Federal Reemployment Bureau. C. N. Nelson is Engineer in Charge under C. H. Apple, District Engineer. The work is under the general direction of H. B. Jay, General Superintendent of Day Labor for the State Highway Department. L. A. Robbins is General Foreman.

Work is conducted with two 6 hour shifts of about 75 men each, distributed as follows:

At Gravel Pit and Mixing Plant—
1 plant foreman.
20 shovelers loading aggregate.
4 truck drivers hauling from stock pile to mixer.
1 mixing plant operator.
1 pumpman.
1 man at gravel receiving hopper.
1 man at clay receiving hopper.
1 man loading trucks with finished mix from storage bin.
2 men levelling loads to make the required 3-yd. measurement.
1 utility man.

At Clay Pit—
6 shovelers loading trucks.

On the Road—
1 foreman in charge of grade.
2 men setting stakes, checking crown, and doing miscellaneous work.
20 truck drivers delivering mix (4 of these take return loads of clay).
1 truck checker.
1 man dumping trucks.
1 foreman in charge of placing, spreading and rolling.
2 tractor operators.
2 grader operators.
2 tank truck operators.
1 truck driver pulling roller.
1 service truck driver.

General—
1 foreman.
2 timekeepers.

Work at the plant begins at 5:30 A. M. and ends at 5:30 P. M. with no time out between shifts. On the road the working time is from 6:00 to 6:00.

Hourly labor rates are:

Common	50c
Truck drivers	60c
Plant operator, tractor operators and grader operators	60-75c

Rolling and Blading Gravel—Sand-Clay Base. William Bros 9-wheel, pneumatic-tired roller pulled by truck. Austin-Western 10-ft. blade grader pulled by T40 McCormick-Deering Diesel tractor.

There are 24 batch trucks—all rented. All other equipment is State-owned. This includes:

1 mixing plant,

1 R.D. 7 Caterpillar diesel tractor,

1 T40 McCormick-Deering diesel tractor,

1 10 ft. blade, hand-operated Austin-Western grader,

1 12 ft. blade, hydraulic-operated Austin-Western grader,

1 6-ton, 9 wheel, pneumatic-tired roller made by Wm. Bros Boiler & Manufacturing Co. of Minneapolis.

1 service truck.

Work was begun July 24 and is scheduled for completion August 12. Besides the surface course, the work includes the placing of approximately 2100 cu. yds. of the gravel-sand-clay mix as base. It also includes the adjusting of shoulders and ditches to grade, and the widening of shoulders to 5 ft. where they are of less than that width. This work will be completed after the surface is finished.

For 30 days after the completion of construction, a service truck and multiple blade maintainer will be operated to repair any defects which may develop and to insure a smooth and even surface.

Another View. Aggregate conveyor and one corner of aggregate hopper at left, storage bin and finished-product conveyor at right; calcium chloride shed, clay conveyor and clay hopper at back center, aggregate stock pile in left background.

35-YEAR OLD BRICK PAVEMENT REJUVENATION, FORT SCOTT, KAN.

By FREEMAN D. MARTIN
Commissioner of Streets and Public Utilities

Brick in Tie Holes Rolled, Ready to Fill Voids.

AN IMPROVEMENT now in the seventh month of progress at Fort Scott, Kan., holds front rank, when the many benefits derived therefrom are carefully considered. First: Streets that were paved with vitrified bricks as long as 35 years ago, which had become extremely rough through use, repairs on pipe lines and removal many years ago of old street railway tracks and not the ties, are now being torn up. Second: A 22 per cent set-up of new brick specified to replace broken brick has made it possible for the government to purchase 500,000 brick from the Western Shale Products Co., a local plant, thereby creating extra labor for 70 employes, necessary to operate this plant. Third: Our engineering estimates, approved by W.P.A., will cause to be expended approximately $60,000 for labor and $33,000 for materials, all of which will be expended locally except for the purchase of the asphalt filler, and Fourth: Fort Scott is to be given over 78,577 sq. yd. of pavement that is almost as good as new.

Construction Break Down—To arrive at costs of material and labor the Project was segregated as follows, indicating the step by step construction plan:

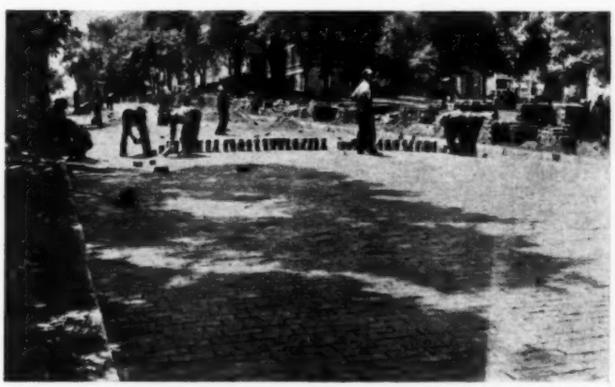
Removing brick and cleaning sand cushion
Cleaning brick
Culling and stacking brick
Removing old ties from street railway bed
Preparing base
Filling tie holes with hand sledged culled brick
Rolling old base to settle filled tie holes with 10-ton roller
Spreading old sand which had been rescreened
Disposing of old brick
Placing new and reclaimed brick
Rolling brick with 5-ton tandem roller
Placing asphalt filler
Sanding completed work

Construction Operations—The streets that are under reconstruction had sand filler, therefore, the removal of the brick was not difficult. Fifty men were all placed on this first work and by the second day 35 men were placed on the brick, which were placed behind the curb line and by using heavy putty knives and wire brushes these brick were cleaned and stacked. A portion of the culled brick were left in piles, to be used later in filling in the holes left by the removed ties.

Six to eight men by using picks, bars and wedges, removed the old ties, many of which were in an excellent state of preservation, having been hewn from walnut trees over 35 years ago. Not much difficulty was caused by the concrete base in removing ties as concrete of 35 years ago was not as strong as portland cement concrete of today.

After the ties were removed 4 men filled the holes with culled brick which were hand sledged. Next this track section was rolled about 6 times with a 10-ton roller.

The old sand cushion was removed down to the old



Relaying Old Brick, Culled and Turned.

Hand Sledged Brick in Tie Holes, Ready for Rolling.

Removing Brick by Hand Labor.

Applying Asphalt Filler.

concrete base and placed in uniform piles, about 15 ft. apart on each side of the center line of the street. Four men accomplished this work. Six semi-vertical sand screens that could be easily moved were placed on each side of the street; screens were about 7 ft. high and 3 ft. wide. Six men screened the cushion sand and refuse matter removed; some was placed with the culled brick that filled the old tie holes, to help fill the voids.

The cushion was now replaced and about 40 tons of rock dust or sand added for every 1,000 sq. yd. to bring the new work to an excellent grade. One man with a sand loop and one helper kept ahead of the brick gang, consisting of 8 men loading, 4 men on wheel barrows, 2 stackers and 2 men laying brick. This gang on good run days laid 760 sq. yd.

One man firing an 8-drum kettle, with one man feeding, one man wheeling and two men cutting asphalt followed the brick layers, after the brick was carefully rolled with a 5-ton tandem roller. Our records show 12 lb. of asphalt per square yard was ample for brick filler and a complete coat over the street. A sand cover coat was next spread over the asphalt, before it set, and block by block the street was opened to traffic.

The 22 per cent new brick were laid at all intersections, where traffic is heaviest and this gave us our plan for working the old brick ahead between blocks. All

Old Sand Piled; Screens Back Right; Cleaning Left.

whole brick not used were hauled to vacant city property and will be used in paving short streets, building waterways and manholes for city sewers.

The following totals are of interest:
Estimated yardage 78,577 sq. yd.
Estimated number Brick (2 sizes) 1,783,000
Estimated number Ties removed, 10,360
Estimated number New Brick, 503,000
Estimated number Man Hours, 207,360.

Original estimate called for an expenditure by W.P.A. of approximately $85,000 and $4,600 by sponsor, but the sponsor's portion will increase about $4,000 owing to extra sand cushion required and the construction of new waterways installed to make this an A-1 piece of construction.

Equipment—The following equipment was used and furnished by sponsor:

150 picks
150 shovels
150 brick scrapers
3 axes
1 asphalt power cutter
1 ten ton roller, 3 wheel
1 5-ton roller (tandem)
12 sand loops

Railway Right-of-Way Finished, Ready for Sand Cushion.

6 sand screens
1 complete (40 ton daily) crusher and screen
30 lanterns
2 trucks
1 complete set curb and gutter steel forms and concrete tools
3 tampers
3 water kegs
2 tool boxes
1 asphalt kettle and tools (mounted on wheels)
6 No. 10 sledges
15 street department barricades

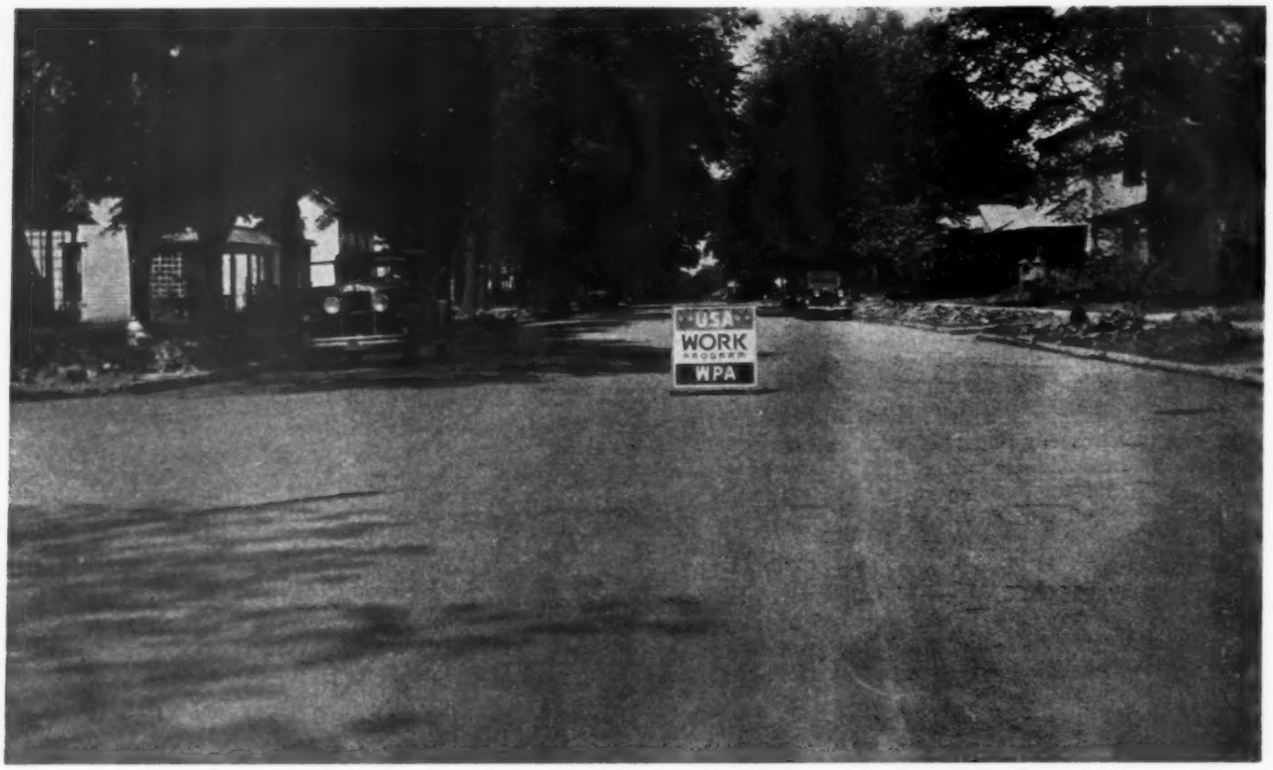
Construction Personnel—W.P.A. District No. 2 with headquarters at Chanute, Kan., furnished the area engineer, superintendent, foreman, timekeepers, and common labor and pays for same.

All plans, specifications, estimates, field engineering equipment, crushing plant, roller operators, waterways and concrete work comes under Commissioner of Streets and Public Utilities of Fort Scott, assisted by a competent crew of engineers and draftsmen.

Photographic Records—As is the custom of the engineering department of the city of Fort Scott, photographic records of all construction has been kept since the present administration has been in office (1933-1936) and believing actual photographs best tell the story, some of the outstanding views have been incorporated in this article.

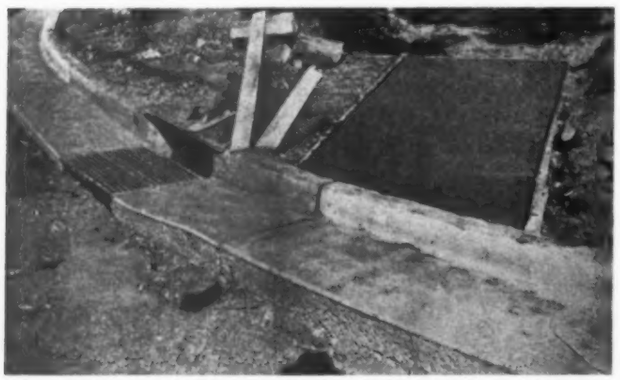
Indications at present warrant our fixing total operating and construction expenditures in various city departments during this administration at $700,000, of which over $400,000 will have been spent in conjunction with W.P.A. and P.W.A. This city, however, has developed only A-1 projects such as this paving project, a new $150,000 filtration plant, a new municipal park costing $100,000 including therein a new $40,000 swim-

Sand Cushion Under Way and Applying Filler.



The Finished W.P.A. Project.

Special Waterway Construction—Main Corner Intersection and Waterway from Hospital Driveway.



Double Corner Catch Basin to Carry Two-Way Surface Drainage.

ming pool and bath house, concrete tennis courts and a $16,000 reinforced concrete band shell, sufficient in size to accommodate a 100-piece orchestra, and appreciating the Government assistance rendered will have spent over $190,000 of its own funds to match Government Grants.

In closing I wish to state our direct association with every department of the Works Progress Administration has been most satisfactory, our projects have been well chosen and I feel no money has been wasted.

▼

Hair-Raising Experience of a Road Hog

The story is told of a driver who, on his day off, went hunting. A terrible storm came up. He looked about for shelter but there was none. It began to rain in torrents, so he crawled into a hollow log. It fitted snugly. The rain lasted for hours, and the water soaked through the wood. The log swelled and the hollow grew smaller. When the storm was over, the hunter could not get out. He stretched and strained to no avail; he was held tight. Like a drowning man, he saw his whole life flash before him, especially his mistakes. He realized what a traffic chiseler he had been—how he had speeded when he knew he might run down a child; how he had hogged the road; how he had woven in and out of traffic; how he had jumped the lights and disregarded stop signs, endangering the lives of all his fellow motorists.

And believe it or not, when he saw himself in his true light for the first time, he felt so small he was able to crawl out of the log without difficulty.—*The AX Junior.*

TALE OF THE CONSTRUCTION CAMP

There Is More Than One Way of Opening Up a Gravel Pit

By LEON ARCHIBALD

ONE of the heroes of this yarn is long since dead because cats, even with their reputed nine lives, don't live so long. The other, a one time water boy, is still with us, and from a superintendent's chair "on the plush" I imagine he turns his head every once in a while toward a west window; looking, wistfully perhaps, for another expanse of prairie to girdle with two lines of steel.

But the days of the steel gang are past. All that remain of them are memories—one in particular.

Several years before the old Canadian Northern lost its identity in the formation of the Canadian National system one of its important branches, the Maryfield extension, ran into a jam which is not listed, in text books at least, as an obstacle common to railway construction.

Along the right-of-way just before it dips into the Souris Valley lived a German homesteader. In sinking a well he came across a sizeable deposit of gravel. And since this is often a scarce commodity on the prairie the C. N. entered at once into negotiations with the homesteader.

The right-of-way agent bought the 15 acre gravel area of the homesteader for $6,000 giving the man the company's check for this amount. A few days later a spur track was run into the deposit followed by the installation of two steam shovels. An "extra" gang of 250 men came out from Winnipeg under a capable foreman and surfacing began. For three days everything ran smoothly. But on the fourth the conductor of the gravel train reported "trouble" stating to Mr. Johnson, the foreman of the surfacing outfit, that the matter was up to him.

It seems that the previous night the homesteader had built a barbed wire fence across the spur track and had posted an order for the train crew to keep off his premises. A hard boiled train crew thinks little of a few strands of wire and went through them thumbing their noses at the infuriated homesteader who stood hard by. They suggested, too, a place where he might go if he felt chilly which, of course, he wasn't.

While the train was out on the track plowing off the German fixed up the fence and when it returned for another load, instead of proceeding noisily on its way it stopped within eyeshot of the barricade.

Comfortably seated in a chair by the repaired fence was the homesteader with a double barreled shotgun across his knees and an unpleasant look in his eye. In addition to the howitzer a toothy, vicious looking bull dog was in strong support in skirmish order.

"What the hell's this mean?" demanded the conductor as he reached the front end.

"You knock down mine fentz again und I shoodt," replied the man.

"Don't waste shells. Just let me have 'em," the bull dog sputtered.

The German then explained that he had not been paid for his land. All he had received was a piece of paper with some hand made writing and figures on it and he held forth paper that looked like a bank check. What he wanted and, he averred, what he was going to have before another load of gravel left the pit, was money—the real thing. The conductor, the engineer, the brakeman and the fireman argued, threatened, swore voluminously and put everything they had on the ball but the homesteader stayed in there. He was ready to pitch strikes.

"Take a run for it," the conductor suggested in an aside to the engineer. "I don't think he dast to shoot."

With one hand on the throttle and the other within quick reach of the air the hoghead eased up the slack. The man cocked the right barrel and, of course, Mr. Westinghouse's contraption won. Not in a walk, mind you, but just sudden and quick like.

"You take her Con," the hogger invited, "I was *never* fond of buckshot. And I'm damned if I like the looks of that bulldog, either."

The trainmen then went into executive session from which they emerged with the unanimous opinion that there was actually little cause for them to test the accuracy of anyone's aim or the sharpness and tightness of a bulldog's front teeth when bared in hostility.

"Le's put it up to Johnson," suggested one of the brakies. "After all, it's his funeral if we can't get ballast up there."

At a distance deemed to be safe, and a little over, Johnson held a parley with the hostile homesteader but the effort was a failure. The man wanted cash while the bulldog wanted action. That, all too patently, was all there was to it.

The nearest available cash was back at headquarters in Winnipeg, 300 or 400 miles away. At best this could not reach the scene of hostilities in much less than two days. In the meantime two or three hundred men and a lot of expensive equipment would be idle. And Johnson did not need to be reminded how all this would sit with the construction superintendent when he heard of it. The foreman shuddered when he visualized the super's displeasure.

"And all this because that damn fool Dutchman don't know what a check is!" fumed the foreman as he reached the boarding car.

"What's the trouble?" asked the water boy, who a few years later distinguished himself by talking back to a regimental sergeant-major. "And say, Mr. Johnson, when do I get that assistant timekeeper's job?" he added purely as a matter of habit.

"Boy," the foreman sputtered, "you ask me that fool question again and I'll take you all apart. Git me that telephone outfit and git it quick!" he ordered.

The telephone was cut in and a message for headquarters dictated to the Maryfield operator. Before reaching Winnipeg that message was handled some four times but upon delivery it still retained enough of its original flavor to bring blushes to the cheeks of an old maidish secretary of considerable service.

Meanwhile the water boy was briskly hopping ties on his way to the "front" to get his information first hand. Here he found the German making methodical preparations for what might prove to be a lengthy siege. His wife had brought out a supply of food and, to guard against a surprise attack should he fall asleep, the bull-

dog's chain was fastened around one of the picket's ankles.

The boy studied the situation when suddenly there dawned upon his alert faculties what he felt was a serious flaw in the German's defense. He pondered the matter for a moment and then exploded in convulsive mirth. The dispenser of lukewarm, alkaline, liquid refreshment hurried back to camp and found Johnson.

"If I move that man, do I get me that assistant timekeeper's job?" he asked of the foreman.

"You—you—you keep away from that crazy Dutchman," exploded Johnson. "I got troubles enough without you throwing in any funerals!"

"Do I?" persisted the water boy.

"Git out of here!" roared the harassed foreman as he reached for something to throw.

"I'll trade you his gun for that job, what d'ye say?"

"*Git!* and min' I told you to keep away from that Dutch lunatic!"

"O. K., boss," the youngster replied as he got ready to dodge a tieplate, "but this afternoon I start workin' for the timekeeper."

The graduating custodian of the water pail found a gunnysack and climbed aboard the cook car. In a minute or two he reappeared and was off up the track carrying something which bulked largely in the bag swung over his shoulder. As he reached the pit spur he sidled up along the gravel train keeping it between him and the guard, while every so often he thumped the contents of the sack upon the ground. The engine was within a few yards of the homesteader's strategic position and the boy reached it without disclosing his presence even to the watchful bulldog. A peek around the pilot revealed that his earlier hopes had materialized —the watchman was dozing.

The water boy untied the bag and then gave its freight an additional, vigorous thump or two together with a judicious kick which produced a blood curdling yowl of protest.

"Now, Jim, do your stuff!" he said as he dumped an enormous, thoroughly mad yellow tom-cat onto the ground.

I don't know which saw the other first— the bulldog or the tom-cat, but in the twinkling of an eyelid they were both messed up with each other, the homestead, and the new fence.

The German dropped the shotgun thereby improving his chances of coming out of the fracas alive considerably.

The water boy pounced upon the weapon and was off down the track like the proverbial bat, leaving Jim to shift for himself, a situation which the cat was taking care of very nicely, thank you.

"Here's the Dutchman's gun; now you birds get up there and tamp ties," the youngster said to Johnson as he climbed the ladder into the foreman's car, "and I'll be up there after dinner to collect them time cards, how about it?"

"You win, boy," Johnson affirmed, grinning, "but how'd you do it?"

"Jim'll be back in a minute or two, ask him. I'm busy."

▼

Highway Research Board to Meet in November

The Sixteenth Annual Meeting of the Highway Research Board of the National Research Council will be held in Washington, D. C., on November 18-20, 1936. Further information concerning the program will be published later.

Cotton Fabric Reinforcement Being Tested in Many States

Cotton fabrics designed by workers of the Bureau of Agricultural Economics and North Carolina State College are being used in road-building experiments in 24 States under Federal-State projects to develop new and extended uses for cotton.

The cotton fabrics, distributed by the Agricultural Adjustment Administration in its program to encourage new uses of cotton, will be used to re-enforce nearly 600 miles of bituminous-surfaced roads in the various States.

The behavior of the roads will be recorded scientifically under all sorts of traffic conditions, and the question settled as to the physical and economic value of this type of road. The effort of the Bureau of Agricultural Economics has been to design a low-cost high-quality fabric for these tests. The quantity of cotton required to manufacture the materials developed by the bureau varies from 5 to 8 bales per mile of road.

The fabric is ordinarily laid over a bituminous priming coat on top of the graded and surfaced road bed. It is covered with a second bituminous coating and crushed mineral aggregate. The road is rolled, and another bituminous coating applied. Into this, a layer of "chips" is rolled.

The oldest known experimental "cotton road" was built in South Carolina in 1926—200 ft. on Route 2, between Chapin and Prosperity.

The bureau reports that cotton fabrics have been used experimentally in bituminous road building in Texas, Louisiana, Georgia, New Jersey, and Mississippi, as well as in South Carolina, but says that the area involved has been too small for the results to be conclusive.

For persons interested, the Bureau of Agricultural Economics, Washington, D. C., has prepared for free distribution a pamphlet entitled "Cotton Fabrics for Bituminous-Surfaced Roads," in which the history and present status of experiments with cotton roads are discussed, and specifications cited of the fabrics developed by the bureau.

There are three weights of fabrics varying in construction. They are all of open-mesh construction. This permits the bituminous material to penetrate and cover thoroughly the individual yarns. The threads are coarse being composed of two-ply sixes grey yarn with the twist balanced so the fabric will lie flat.

▼

Sweden's Capital Plans for Twice Its Present Traffic

The city of Stockholm has spent 29,000,000 kronor ($7,830,000) in the last fifteen years on the construction of 45 kilometers of modern highway approaches to the capital. In the next ten years an additional 15,000,000 to 16,000,000 kronor will be required for further similar work, which will bring the total cost up to 45,000,000 kronor ($12,150,000), or 1,000,000 kronor ($270,000) for each kilometer of highway. This elaborate construction is necessary because of Sweden's rapidly growing motorization, which in ten years is expected to be twice of what it is today. So far four approaches lead into Stockholm from the north and five from the south, but soon there will be several more. Traffic on these highways has increased eleven per cent in the last ten years.

View of Completed Asphaltic Concrete Surface on U. S. 67 in Dallas County

RESURFACING & WIDENING TEXAS' HEAVIEST TRAVELED HIGHWAY

By A. D. STIVERS
Engineer, The Texas Co.

IN 1919 to 1921 Dallas County, Texas, built two roads considered at that time as the last word in modern highways. Both were sections of Texas State Highway No. 1.

The Dallas-Fort Worth Road, State Highway No. 1, U. S. No. 80, was built of concrete 20 ft. wide. This extra 2 ft. in width over the 18 ft. which was more or less standard at that time, was considered an extravagance by many. The Dallas-Texarkana-St. Louis Road, State Highway No. 1, U. S. No. 67, was 18 ft. wide, built of Oklahoma rock asphalt on concrete base as far as Garland, and asphaltic surface treatment on macadam base, the remaining distance to the county line.

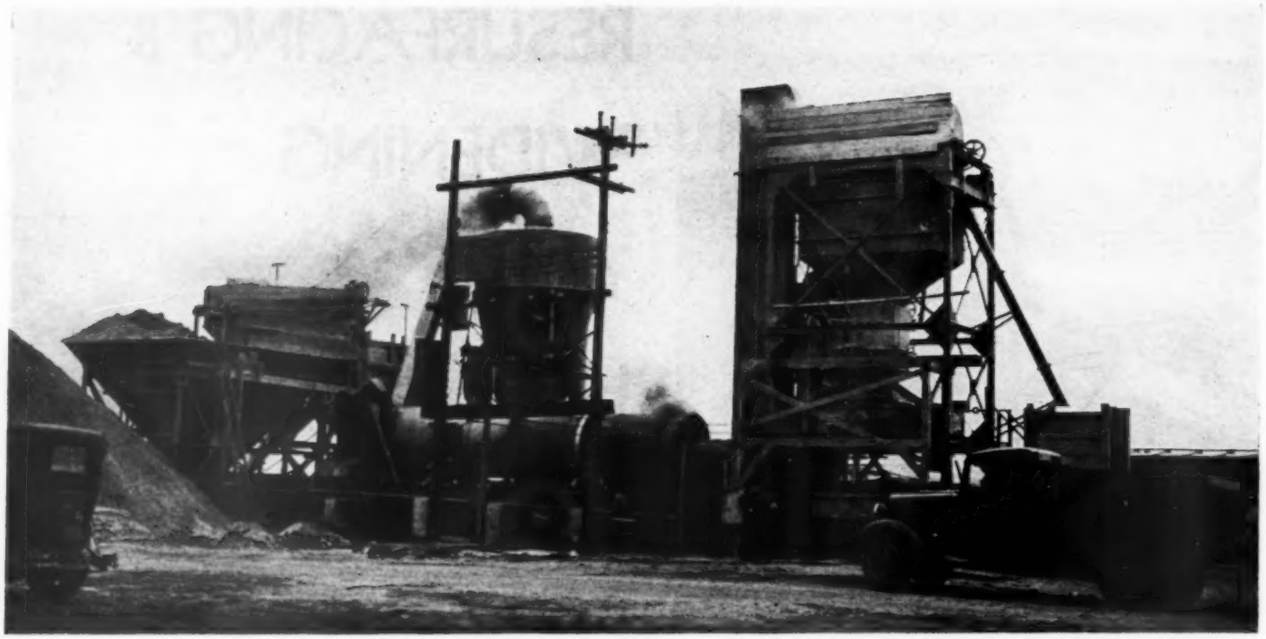
Both of these roads were well located as evidenced by the fact that very little relocation was necessary when they were rebuilt. Both gave good service until traffic conditions made it necessary to widen them. This was done in 1934 on the section west of Dallas, U. S. No. 80, and in 1935 on the section northeast of Dallas, U. S. No. 67.

A small amount of relocation was done on U. S. 80, largely to provide a wider underpass under the Texas & Pacific Railway and one grade change was made on a steep hill. On the remainder of the road, a little more than 10 miles long the old concrete was used as a base for the new pavement. This concrete was somewhat cracked, had some high joints, and some disintegration, but on the whole was in fair condition and entirely suitable as a base for the asphaltic surfacing. This road was widened to 40 ft. for its whole length. Existing improvements along the road and the necessity of securing additional right of way made it advisable to add the extra width in some cases all on one side of the old road, sometimes all on the other side, and sometimes part on each side. A new concrete base was built for the width and on the relocated portion for the full 40 ft. of width.

This new concrete base was artificially roughened. When the old road was used as a base, the surface was painted with cutback asphalt before the asphaltic surface or leveling course was placed. Changes in the cross-section made necessary by the additional width, required that an asphalt base joined the old road surface. This leveling course varied in thickness from 6 in. to a feathered edge. For this reason it was impractical to use any coarse aggregate and it was laid with a modified Topeka mix similar to the surface, but with slightly less asphalt. Where the thickness was more than 3 in., the leveling course was laid in two layers, each layer being thoroughly rolled.

The wearing surface consisted of fine mix asphalt concrete (Modified Topeka) 2 in. in thickness. The upper ½ in. of this surface was a granular or non-skid mix, crushed gravel being used for the coarse aggregate. The surface and the non-skid layer were laid in sections 20 ft. wide and finished with a mechanical screed. Rolling was very thorough and a very smooth surface was

Laying Asphaltic Concrete Surface on Dallas-Fort Worth Road



General View of Asphalt Plant of Central Bitulithic Co.

secured. Twelve ton three-wheel rollers, ten-ton tandems, and an Austin Roll-A-Plane were all used in rolling.

On U. S. 67, the procedure was very similar. The old Oklahoma rock asphalt surface was in fair condition and entirely adequate for a base. Very little relocation was necessary, but one short section with a sharp curve being changed. New concrete base was placed to widen the road to 40 ft. to its intersection with a belt line surrounding Dallas and to 30 ft. from this point to Garland, a total distance of about 10 miles. The portion from Garland to the county line will be reconstructed when Texas Centennial rush traffic is over.

C. L. Williford of Dallas was in charge of the work for the Texas State Highway Department. It was constructed by the Central Bitulithic Company, of Dallas. Crushed gravel was used for coarse aggregate. This is a tough limestone gravel, and had 75 per cent crushed faces. Texaco No. 54 paving cement was used in leveling course, wearing surface and non-skid surface.

This is the heaviest traffic road in Texas and the new 40 ft. road is giving perfect satisfaction. It is smooth, resilient and perfectly non-skid under all weather conditions. Best of all Dallas County utilized about 80 per cent of its old investment in building this new superhighway.

Placing the Non-Skid Surface on New Asphaltic Concrete

Objections to Joint Winter Maintenance by State and Counties

The following interesting comment is from the report of the New York State Superintendent of Public Works for the year 1935:

"Under section 53-c of the Highway Law, the counties may remove snow from State highways, erect snow fences, and sand slippery highways, the State paying half the cost up to $50 per mile. Due to poor sanding in many counties, the State some few years ago started sanding in those particular counties. The State now sands roads in practically every county of the State to a greater or lesser extent depending upon the amount of such work done by the county authorities. In 1935 nearly $700,000 was spent by the State for this work.

"We feel that this work could be much more economically done if both the sanding and snow removal were done either by the State or by the counties. A large portion of the cost of sanding at the present time is necessary because of poor snow removal by county or town forces. If the counties were charged not only with the duty of removing snow but also with the duty of sanding icy pavements, the removal of the snow would be more efficiently done because the additional cost of snow removal would be saved many times over in the savings made in sanding. The counties feel, however, that if they are to not only remove snow but sand State highways, they should be paid additional money. Most of the counties feel—and I believe with justice—that the State should pay the entire cost of maintenance of its highways throughout the 12 months of the year. Whether or not this will be done can be determined only by the Legislature, but in the interests of efficiency and safety, laws should be passed whereby either the State or the counties take over the problem of not only removing snow but sanding icy pavements—let the cost fall where it may. The writer believes that the entire cost, within reasonable limits at least, should be borne by the State."

CONCRETE AND SOILS AT A. S. T. M. MEETING

THE reports of A.S.T.M. Committees C-9 on Concrete and Concrete Aggregates and of D-4 on Road and Paving Materials and four technical papers featured the 13th session of the 39th annual meeting of the American Society for Testing Materials, held June 29-July 3 at Atlantic City, N. J. Three new standards proposed by Committee C-9 were approved as tentative; they cover a method of test for flow of concrete by use of the flow table; making flexture tests using a simple beam with third point loading; and determination of coal and lignite in sand. New definitions were submitted as tentative covering "admixture," "gravel," "crushed stone," "blast furnace slag," "fineness modulus," and "crushed gravel."

In a paper by F. E. Richart and J. E. Keranen, University of Illinois, appended to the C-9 report the characteristic difference between Haydite and sand-gravel concrete as regards shrinkage and water loss were reported. When stored in air at 70 F. and 60 per cent relative humidity, the Haydite concrete showed extremely high water losses and relatively low shrinkage for the first two months; after 2-year storage the shrinkage of all-Haydite concrete slightly exceeded that of sand-gravel concrete. The shrinkage-time curves for all-Haydite concrete for the first two months were nearly straight lines, indicating a delayed or inhibited shrinkage due to the presence of a large amount of absorbed water. Due to a very large water content, the lean Haydite concrete showed more shrinkage than the richer mixtures at early ages; however, at the end of 2 years, the richer mixture showed the greater shrinkage. The initial absorbed water in Haydite aggregate, and that absorbed during curing, may form a large part of the water content of the concrete, and will affect the water lost in air storage. Haydite concrete thus does not follow the usual relation between water loss and shrinkage.

Stanton Walker and C. E. Proudley of the National Sand and Gravel Association in a paper appended to the report of Committee C-9 on the subject of "Sodium and Magnesium Sulfate Soundness Tests" described some of their experiences in the conducting of tests for soundness. Tests were made to furnish data on the effect of variations in procedure which, in general, were within limits established in the A.S.T.M. Tentative Method of Test for Soundness of Fine Aggregates by Use of Sodium Sulfate or Magnesium Sulfate (C 88—35 T) and Tentative Method of Test for Soundness of Coarse Aggregates by Use of Sodium Sulfate or Magnesium Sulfate (C 89—35 T). The data indicated that the procedures outlined in A.S.T.M. test methods C 88—35T and C 89—35 T are neither sufficiently definite nor restrictive to insure uniform test results. They lend support to the statement accompanying the test methods that results should be used only as a guide and not as an arbitrary basis for rejection. It seems clear that either the present methods should be surrounded with further restrictions or that another procedure, less sensitive to minor variations in technique, should be adopted. To do the first would make it difficult for the tests to be carried out as routine in the average laboratory. Particular attention should be paid to the latter alternative if testing engineers are to continue to use sodium and magnesium sulfate in accelerated soundness tests of aggregates.

An extensive paper included as part of the C-9 report on "Studies on Relation Between Characteristics of Blast Furnace Slag and Other Coarse Aggregates and the Properties of Resultant Concretes" by Fred Hubbard, National Slag Association, described an investigation that was made of the physical and chemical characteristics of blast furnace slag from sixteen commercial and four non-commercial sources, gravel from six commercial sources and crushed stone from six commercial sources. These materials were all incorporated in concrete for compression, transverse, absorption, wear and durability tests. The same sand and cement was used throughout the series and all concrete was mixed to the same consistency. Yield tests were made on a mixture containing each of the aggregates and the materials required for a cubic yard of concrete determined.

The author indicates two important facts which stand out as a result of the investigation—first, the effect of curing on the strengths of concrete after the lapse of long periods of time, and second, effect of the cement content of concrete on its durability. It is indicated that blast furnace slag is a dependable and satisfactory aggregate for concrete and that it can be used with confidence that the results will be satisfactory. Hedging the material about with complicated specification limitations is meaningless, unnecessary and undesirable. The unit weight of the material is a measure of quality and a means by which only desirable slags may be accepted.

On the other hand, extremely heavy slags are no better than medium weight slags and for some purposes less desirable than the lighter materials. A compact weight of 70 lb. per cubic foot graded as ordinarily required for concrete aggregate will insure the acceptance of only desirable materials.

In another paper appended to the C-9 report, Messrs. Vidal and Samson, U. S. Bureau of Reclamation, Denver, describe in detail the apparatus and technique used in making permeability tests on concrete using pressures equivalent to heads of water as high as 1,000 ft. Tests were made on various sizes of specimens, the largest being 18 in. in diameter, with maximum size of aggregate, 9 in.

In his paper on "Testing and Design of Stabilized Soil Mixtures" C. A. Hogentogler, Jr., George Washington University presented a resume of the theory of soil stabilization; role of electro-chemical phenomena; theory and technique of the Proctor field tests and laboratory adaptations; effect of admixtures; and design of soil mixtures by means of stability tests.

A discussion of tests carried on at the Engineering Experiment Station, University of Illinois, in cooperation with A.S.T.M., was given in a paper on "The Effect of Testing Speed on Strength and Elastic Properties of Concrete" by Messrs. Jones and Richart. Tests were made on three grades of concrete, at ages of 7 and 28 days. Loading of a 6 by 12-in. cylinder to failure was accomplished in periods of 1 sec., 5 sec., 20 sec., 1 min.,

2 min., 10 min., 30 min., 1 hr., and 4 hr., with a corresponding rate of stress application ranging from 3,870 down to 0.12 lb. per sq. in. per sec. For all but the very slow loading rates, autographic records of load, strain and time were taken by means of an oscillograph recorder, equipped with super-sensitive elements.

The test results indicate that the strength values obtained increase with increase in speed of loading, the ratio of strengths for the highest and lowest rates used being about 1⅓ to 1. The secant modulus of elasticity at 90 per cent of the maximum load also increased with increase in rate of loading. This indicates that a part of the measured strain in the tests is due to creep; the amount of this creep increases with the length of time involved in the test.

Prof. W. S. Housel in his paper on "Internal Stability of Granular Materials" discussed inconsistencies which have arisen in internal friction theories and presented the results of a series of tests on five different granular materials. In these data there is no direct relation between shearing resistance, or friction, and the principal pressures which express internal stability in a granular mass.

A general equation for ultimate bearing capacity was reported as well as an equation to represent pressure distribution and capacity at loads less than ultimate. The results of a comprehensive series of bearing-capacity tests on the same materials used in other types of tests were presented and correlated with the internal-stability relations.

The paper concludes that the behavior of granular materials under stress can be accurately and simply described in terms of the stability of elementary arches of soil particles in which the ability to sustain vertical pressure is dependent on the horizontal thrusts supplied by adjacent particles in the mass. The relation between the vertical and lateral principal pressures depends simply upon the angle of transmission between the arch axes or lines of contact between particles and the vertical axis of reference.

▼

Preservation of Bench Marks

In the extension of its system of control surveys over the United States, the U. S. Coast and Geodetic Survey has run many hundreds of lines of levels, of first- or second-order accuracy, which now form a great net over the entire country with the lines spaced, except in some of the more inaccessible regions in the West, at intervals of about 25 miles. Bench marks are spaced along these lines at intervals of from 1 mile or less to a maximum distance of 3 to 5 miles.

These bench marks and their published descriptions and elevations represent a vast outlay for field work, computation, and adjustment. In order that the results of this work may be useful to all engineers throughout the Nation the marks must remain in place undisturbed or be relocated in such a manner as to preserve their usefulness.

In spite of the extreme care exercised by the field parties, in placing bench marks where they are likely to remain undisturbed for a long time, it sometimes becomes necessary to destroy them to make way for construction, repair, or maintenance work of various kinds. A bench mark once disturbed, without transferring its elevations to some other mark which is set to preserve it, is a total loss and leaves a gap in the line of levels which requires extra running for all engineers who may be called on to do leveling in the locality at any future time.

It is to the interests of all concerned to relocate bench marks which are in the way of construction rather than to allow them to be completely destroyed. The Coast and Geodetic Survey does not have funds available for placing parties in the field to go about and relocate bench marks which must be moved to avoid their destruction. On the other hand, since the marks are chiefly useful to practicing engineers, whether public or private, the Survey looks to all engineers throughout the country for cooperation in preserving these useful marks in their own interests as well as in the interests of their government.

A routine method of handling cases of this sort has been worked out and if followed out, as outlined by Howard S. Rapplege, Chief, Section of Leveling of the Survey, in July *Public Roads,* the loss of bench marks and its accompanying inconvenience and loss to the engineers and surveyors of this country will, to a large extent, be avoided.

The method follows: As soon as it becomes known that a mark must be moved, a letter should be sent to the Director, U. S. Coast and Geodetic Survey, Washington, D. C., attention Section of Leveling, stating the necessity for moving the mark and giving its designation. The designation consists of the letters and numbers found to have been stamped with dies on the disk. It is desirable to furnish a rubbing of the disk as well. A rubbing can be made by placing a piece of medium-weight paper over the disk and then rubbing over the paper with a hard pencil to bring out the legend cast in the disk, especially the letters and numbers stamped on it with dies.

Upon receipt of this information, the office will send out a new disk properly stamped to show that it has been reset. Necessary instructions for the establishment of the new mark and the transfer of elevation will also be sent. The proper procedure, in most cases, is to establish the new mark in a safe place nearby and transfer the elevation from the old mark to the new one by means of an engineer's level and rod. The levels should be run in duplicate to avoid the possibility of large errors, and all readings should be made to three decimal places in order to preserve the accuracy of the original elevation.

The old mark should not be disturbed until the observations involved in the transfer have been checked by the observer or the recorder. An assumed elevation for the old mark may be used in the transfer, since what the Coast and Geodetic Survey is primarily concerned with in a case of this sort is the difference in elevation between the old mark and the new one established to replace it.

After the new mark has been established and the elevation transferred to it, the old disk should be broken out and returned to the office of the Survey in a franked mailing sack, which will be supplied for the purpose. A complete report on the action taken, including a description of the location in which the new mark is established and a copy of the field notes involved in the transfer of elevation, should also be forwarded to the office; a franked envelope will be furnished for this purpose.

Bituminous Materials Discussed at A. S. T. M. Meeting

SIX technical papers on bituminous materials and the annual report of A.S.T.M. Committee D-8 on Waterproofing and Roofing Materials featured the 15th session of the 39th annual meeting of the American Society for Testing Materials, held June 29-July 2 at Atlantic City, N. J. Appended to the D-8 report was a paper "Comparison of Abrasion Test Methods for Embedding of Granular Mineral Surfacing on Asphalt Roofing" by H. W. Greider and G. A. Fasold of the Philip Carey Mfg. Co.—this paper giving results which should be of considerable interest to producers and users of bituminous roofing of cooperative comparative tests sponsored by the committee.

Among the conclusions believed justified is that abrasion tests on granule surfaced roofing will readily distinguish between mechanically "well embedded" and "poorly embedded" mineral surfacing and that the value of such abrasion tests lies chiefly in their use as a means of control of manufacturing. An abrasion method, such as the Carey test, which does not require a standardized brush or rechecking of the brush, has a distinct advantage for such control testing. The Minnesota Mining Rub Test method was indicated as being more sensitive to differences in degree of embedding than either the Funkhouser or Carey test methods.

The durabilities of filled and unfilled coating asphalts were compared, both in outdoor and in accelerated exposures in a paper on "The Effect of Mineral Fillers on the Serviceability of Coating Asphalts" by O. G. Strieter, Research Associate for the Asphalt Shingle and Roofing Institute at the National Bureau of Standards. The tests show that in general the durability to weathering of coating asphalt can be improved by the addition of mineral fillers and that there is a difference in the effectiveness of various fillers. The data demonstrate the similarity between outdoor and accelerated exposures.

In a paper on "The Susceptibility of Asphalts to Temperature Change," Messrs. Schweyer, Coombs, and Traxler of the Barber Asphalt Co. described an asphalt viscosity index to express susceptibility, that is, the change of consistency with change in temperature. The authors indicate that while no type of equation has been found that is of practical value over a wide temperature range, at processing temperatures where the asphalts have viscosities ranging from 1 to 5 poises and at service temperatures (15 to 35 C., 59 to 95 F.) as a log-viscosity *versus* temperature plot is a straight line within the limits of experimental error. For these regions a new, simple and logical way of expressing susceptibility based on the percentage change of viscosity for a one degree rise in temperature is proposed.

Aging phenomenon in which asphalts maintained undisturbed at 25 C. showed increased viscosities with time was discussed in another paper by Messrs. Traxler and Schweyer on "Increase in Viscosity of Asphalts With Time." From the data obtained, the authors believe it is evident that certain asphalts age harden more rapidly and extensively than others, and that the phenomenon in air-blown asphalt is different than in steam- or vacuum-refined materials. Adding mineral filler to an asphalt has very little effect on the rate of age hardening. An Asphalt Aging Index was proposed which quantitatively evaluates the rate of increase of viscosity with time. Development of a thermally unstable structure within the asphalt is probably the cause of the age-hardening phenomenon, it was indicated.

Roland Vokac, Chief Engineer of Paving Research, The Barber Asphalt Co., in his paper on "Compression Testing of Asphalt Paving Mixtures" reported his belief in the utility of this testing method and indicated that such fundamental characteristics as compressive strength and elastic limit may be readily evaluated and used for the purpose of specification and design.

"A Further Study of the Heterogeneity of Asphalt—A Quantitative Method" was presented by G. L. Oliensis, Laboratory, The Barber Asphalt Co., this paper comprising a further discussion of the significance of the spot test. Several additional causes of heterogeneity were explained, other than high temperatures and a method of determining heterogeneity quantitatively was presented.

In their paper dealing with "Measurement of High Viscosity—A Rapid Method," Traxler and Schweyer describe four methods which are used, the capillary tube viscometer, alternating stress method, rotating concentric cylinder viscometer and the falling coaxial cylinder type. The last-mentioned instrument seemed to offer several advantages over the other methods and twenty-five different sizes of viscometers were studied in order to select the most satisfactory instrument for rapidly measuring viscosities above 5,000 poises. This instrument has been adapted so that it can be used as a laboratory control viscometer for a very wide range of viscosities. The authors indicate that the apparatus selected will measure viscosity in 10 to 100 sec. over a range from 5,000 to 1,000,000,000 poises and that it should be useful in studies of natural and synthetic resins, tars, and asphalts.

▼

Session at A. S. T. M. Meeting on Cement, Lime, Aggregates

THE Twelfth Session of the 1936 American Society for Testing Materials at Atlantic City, June 29-July 3, comprised six technical papers and two committee reports dealing with cement, lime and aggregates. Recommendations made in the report of Committee C-1 on Cement were approved including revisions of the Tentative Specifications for High-Early-Strength Portland Cement (C 74-30 T) involving a new definition, insertion of optional compressive strength requirements and a fineness requirement prescribing a specific surface of not less than 1,900 sq. cm. per gram of cement. The revised specification is to be submitted to Society letter ballot for adoption as standard.

A proposed specification for high-early-strength treated portland cement which was preprinted in the report with withdrawn by Committee C-1. The only difference between this and C 74 was in the definition which permitted certain additions not allowed by the definition in C 74. This feature is to be incorporated in C 74 instead of having a separate specification.

S. B. Biddle, Jr., and Alexander Klein, University of California, described "A Hydrometer Method for Determining the Fineness of Portland-Puzzolan Cements." To supplement the common methods of mechanical an-

alysis of portland cement and to assist in extending the use of such methods into the field of portland-puzzolan cement, a hydrometer method of analysis has been adapted from that commonly used in soil analysis. The paper states that if a sample of cement is uniformly dispersed in a suitable liquid medium and simultaneous observations of elapsed time and of specific gravity (as measured by a hydrometer) are made as the particles settle, the particle-size distribution and surface area of the sample may be calculated. It has been demonstrated according to the authors that for portland cements the surface area thus obtained is in reasonable agreement with values obtained by independent methods, and that for portland and portland-puzzolan cements the values are reproducible to a satisfactory degree, perhaps plus or minus 3 per cent.

An interesting paper on "The Influence of Low-Curing Temperatures on the Hardening of Cement Mortars" by S. A. Mironoff, Central Institute for Industrial Building Research, U.S.S.R., which was presented by J. C. Pearson, Lehigh Portland Cement Co., states the opinion that in accordance with the theory of swelling, cement particles are hydrating in water, the hydration gradually extending from the surfaces deeper into the grains, that swelling takes place more rapidly at low temperatures (around 2C.) and that the formation of calcium silicate gel proceeds more slowly at low temperatures retarding the beginning of crystal formation and of intensive hardening. The paper states that the principles enumerated in the paper have been fully proved by the results of experiments.

In another paper on "Petrographic Studies of Hydrated Cements," L. S. Brown and R. W. Carlson, Massachusetts Institute of Technology, describe a method of making distinct thin sections of hardened cement and concrete and give results of investigations into the nature of the gel in hydrated cement, and the gel structure. The authors conclude that as observed by microscopic examination of this section, set cement consists mainly of three components: calcium hydroxide crystals, calcium silicate gel, and unhydrated cores of cement grains. The gel, which is porous, appears to fill substantially all intergranular spaces not filled by the hydroxide. Thus the degree of porosity of the gel varies with the conditions under which it is developed, particularly with the available quantity of gel-forming material as related to the volume of pores to be filled. Coarse cement and high water content produce more porous gel than do fine cement and low water content. Correspondingly, coarse cement and high water content produce large crystals of calcium hydroxide and low strength.

The paper reports that the strength of portland cement is probably developed by the gel acting as a void-filling glue, rather than by any type of crystallization. Other things being equal, the less calcium hydroxide observed in a thin section, the greater the corresponding strength.

D. O. Woolf, U. S. Bureau of Public Roads, described a "Cone Method for Determining the Absorption by Sand." The paper discusses the various methods which have been used for determining the absorption by sand and indicates the difficulties and errors in these methods. The results of a cooperative series of tests, performed by twelve laboratories, in which the cone method is compared with three other absorption methods indicate that the cone method is superior to the other methods used and that it furnishes a reliable and accurate result with a minimum of equipment and working time.

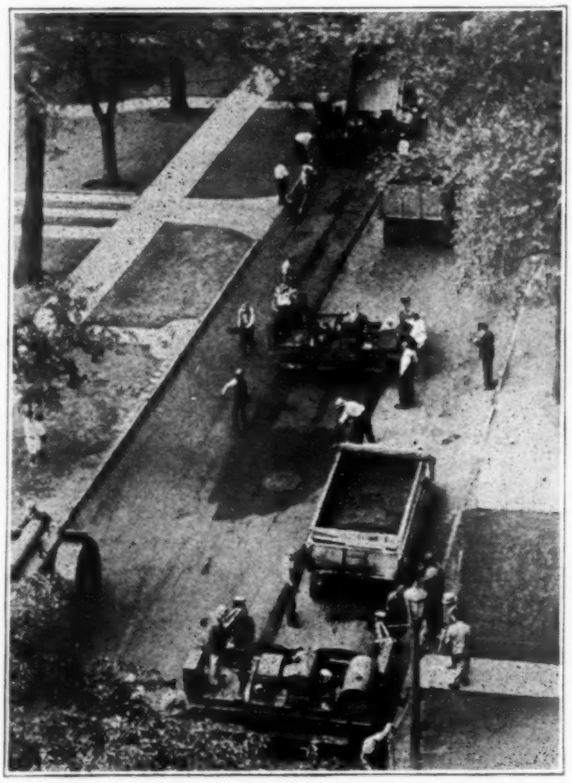
In a paper on "Elastic and Thermal Expansion Properties of Concrete as Affected by Similar Properties of the Aggregate," L. H. Koenitzer, Kansas State Agricultural College, concludes on the basis of rather extensive tests that (1) each of the ingredients that enters into a concrete mixture plays an important but somewhat unknown part in fixing the volumetric and elastic properties of the resulting concrete; (2) the elastic properties and linear change with temperature of the individual materials entering into the concrete mixture are not indicative of the results secured with the concrete mixture; (3) the elastic and thermal expansion properties of the different materials vary among themselves. For any one material those properties vary with the condition of test, the greatest variation being caused by freezing the specimen.

▼

The Evanston Resurfacing Job

The picture below is another view on the asphalt paving work at Evanston, Illinois, which was described in detail in the July issue of ROADS AND STREETS. We reproduce it here because it shows the manner of operating three paving machines to make a quick, hot joint between strips, more clearly than any of the views in the original article. We are indebted to *The Evanston Review* for the use of the cut.

We regret that several typographical errors occurred in the account in the July issue. The following corrections should be made: On page 23, asphaltic cement specifications, item 3 should read "Ductility at 77° F." instead of at "70° F." Item 4 should read "Ductility at 39.2° F." instead of at "372° F." On page 24, column 2, line 6, the word "maximum" should be changed to "minimum."



Continuous Asphalt Surfacing Operation with Three Pavers

Progress at PARKLAWN AND GREENDALE

By JOHN C. BLACK
Field Editor, Roads and Streets

PARKLAWN
General View of Construction Looking Southeasterly from the Park. The central steam heating plant is located a short distance to the right of this picture.

EXTENDED accounts of two Federal projects—one in, the other near, the City of Milwaukee—were given in the July issue of ROADS AND STREETS, the descriptions and photographs showing conditions at the end of May.

A visit to the projects, on July 23 and 24, disclosed conspicuous progress, a general idea of which can be obtained by comparing the accompanying pictures with those published in July.

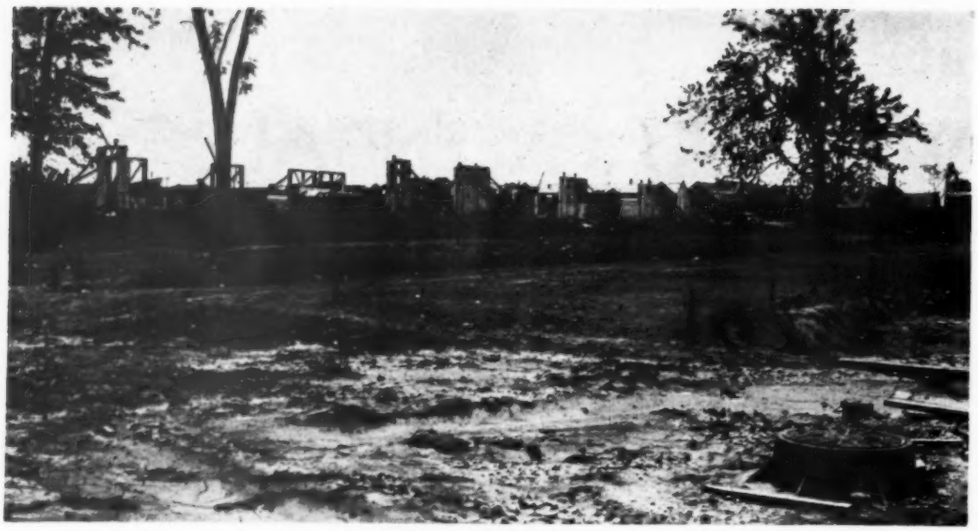
On both jobs, the management stated that there had been a loss of approximately a week's time due to the excessive heat in the fore part of last month. There were numerous prostrations among the workers, and on several days work was actually closed down.

PARKLAWN
Utilities Tunnel Partly Constructed. There is less head room at this point than in most parts of the tunnel. Note the right angle turn at right of picture.

Morale and efficiency on both projects appeared distinctly better than on most federal relief work, due, in my judgment, to a combination of reasons. The Parklawn work, it will be remembered, is by contract, while the Greendale job is being done directly by the government, but the spirit is evident in both. Energy and genuine interest by those heading the work, the feeling of worth-while accomplishment as against the demoralizing effect of shoveling from one pile to another for the sake of shoveling, and the fact that most men like to build houses seem to be the stimulating factors.

PARKLAWN

At Parklawn, the Public Works Administration's housing project in Milwaukee, about 550 men were at work on July 24. The number is adjusted from day to day according to job requirements, and is often considerably greater. At times when the condition of the work warrants, an extra shift is added, but otherwise everything is done by a single shift in a 40 hour week. Only union labor is employed. The building trades workmen are on PWA rolls—all others on WPA.



PARKLAWN
Looking Southeasterly from the Intersection of West Congress Street and the East Branch of Parkway Drive. Completed grading for the drive is shown in the middle ground.

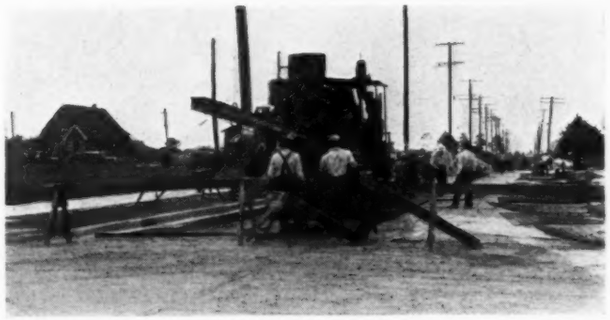
PARKLAWN
Excavating for Sewer with a Koehring Trench Hoe Near Center of Project.

Parkway Drive and the service drives and courts are partly graded, but no attempt is being made to pave them until other construction is more nearly completed. The generally smooth and level character of the ground makes truck operation easy and largely independent of road construction. There is surprisingly little dust. Enough pavement will be laid before fall to carry construction traffic during wet weather. Boundary streets and approach streets are being constructed rapidly by the City of Milwaukee under separate projects.

An especially interesting feature is the utilities tunnel which will make a circuit of the tract, connecting the groups of buildings, and carrying water mains, steam heating mains, electric supply lines and telephone cables. It consists of a rectangular concrete box, the top of

PARKLAWN
Clearing Operations—Stumps Being Loaded on Ford Truck by Northwest Shovel.

PARKLAWN
A Group of Foundations in Northwest Portion of Tract. The freshly poured concrete floors are covered with canvas held down by bricks. A Caterpillar 40 with bulldozer is levelling up the ground near center of picture.



PARKLAWN
Paving West Hope Avenue on the Approach to the Project. Smith 27-E Paver at Work.

which is at or near the ground surface. The inside height varies, but is sufficient at all points to permit passage for inspection and repairs.

Building construction has progressed rapidly. Many houses in the southern portion of the tract are under roof, walls are going up in the east, and foundation and floor construction are in progress in the northwest. As mentioned in July, a very substantial type of construction is being used, foundations being of conerete block, floors and ceilings of reinforced concrete, and walls of brick facing with tile back-up. Roofs will be of tile on wood rafters and sheathing.

The heating plant boilers have been delivered, and the steel superstructure for the building is going up. Park and playfield are nearing completion.

GREENDALE
View Looking Northeasterly from Observation Tower—Showing House Foundations in Foreground and Middle, with North Road Between and Birch Street Extending Down at Lower Right Hand Corner. Compare this view, taken July 24, with the view of the same area May 25, shown on page 37 of ROA DS AND STREETS for July

GREENDALE

Proportioning Plant of Central Ready-Mixed Concrete Co

GREENDALE

During the past two months, the Greendale project has progressed from the stage of initial grading and road making to the completion of a large number of building foundations and the beginning of work on superstructures. This project, conducted by the Federal Resettlement Administration, is located about 9 miles from Milwaukee's business center.

On July 23 about 800 men were engaged, and it is expected that the number will be increased to 1200 before the end of August. The working day is 8 hours, with a maximum of 88 hours per month allowed to any one man. In general the work is conducted by two gangs alternating every two weeks. All employment is under WPA.

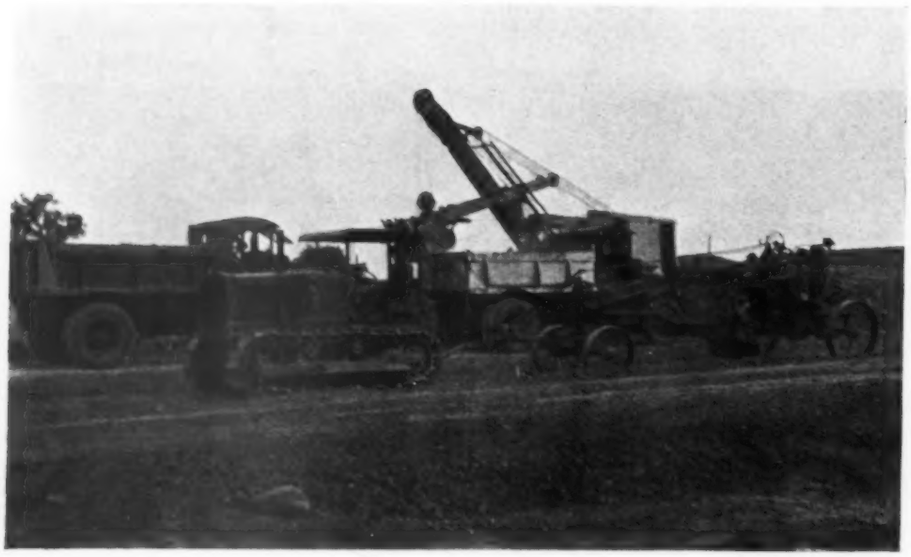
The base course of crushed gravel has been laid on main roadways and on some secondaries. After proper spreading by blade grader, it has been allowed to consolidate under traffic—a process which has worked well, the trucks having covered it so thoroughly that it now presents a very hard and surprisingly smooth surface. No bituminous top will be laid until heavy construction trucking has ceased.

GREENDALE

The Gravel Pit. Portable Crusher Made by Wisconsin Highway Machinery Co. Being Loaded by Northwest Engineering Co. Shovel.

GREENDALE

Broad Street, Looking South from North Road.

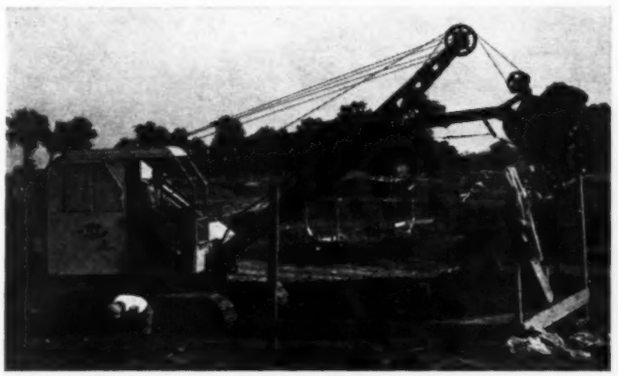


GREENDALE

Activity at North and Grange Roads. The Galion Grader and Monarch Tractor combination is doing a finishing job while the Northwest Shovel loads trucks at the side. The two trucks in this picture are Macks.

GREENDALE
Allis-Chalmers Patrol Grader Working on North Road Near Grange.

Gravel for both roads and buildings comes from a pit located on the tract at a distance of about 1½ miles from the center of building operations. The excavating shovel delivers the raw material directly to a portable crushing and screening plant which was turning out from 70 to 75 yards per hour at the time of my visit, but has a 90 yard capacity available.



GREENDALE
Excavating for Small House Basement with P. & H. No. 150 Shovel Equipped with ½-Yd. Dipper. Chevrolet Truck Backing in for Load.

Concrete is supplied under contract by the Central Ready-Mixed Concrete Co. of Milwaukee, using material from the project pit for both fine and coarse aggregate.

All mixing is done in truck mixers, from three to seven being used at the present stage of the work. All but one of these are 2½ yard Rex Moto-Mixers, the odd member of the fleet being a 4 yard Paris machine. These mixers deliver concrete as needed, up to 300 cubic yards per day. The coarse aggregate ranges from No. 4 to 1½ in. size, all but a small part passing a ¾ in. screen.

GREENDALE
Stripping and Piling Top Soil with 8-Yd. Heil Dig-N-Carry Scraper Pulled by Allis-Chalmers 75 Tractor.

Motor Trucking of Farm Products Continues to Increase

Movement of farm products to market by motor truck —many shipments travelling long distances over the roads of several states—is continuing to increase, according to the U. S. Bureau of Agricultural Economics.

The movement includes large tonnages of fruits, vegetables, cattle, hogs, sheep, milk, butter, eggs, poultry, and other farm products.

Compilations by the Bueau showed that nearly 17 percent, or 107,422,000 lbs., of total receipts of butter at New York, Chicago, Philadelphia, and Boston, came to market by truck in 1935. The Chicago market received 35 percent of its butter by truck last year compared with 30 percent in 1934, and New York received 9 percent of its butter last year compared with 3 percent in 1934.

The egg movement by truck also increased. In the case of the Chicago market, 56 percent of its eggs were received by truck in 1935 compared with 38 percent in 1934. At New York receipts of eggs received by truck increased from 13 percent in 1934 to 21 percent in 1935.

For the Chicago, New York, Boston, and Philadelphia egg markets 32 percent of the receipts, or 4,001,000 cases, of the total receipts at four markets, were hauled by motor trucks last year compared with 21 per cent, or 2,640,000 cases, in 1934.

Distance from market is becoming less of a barrier. The study of the truck movement shows that eggs are received in the New York market by motor truck from markets as far distant as Missouri and the Dakotas. Conveyances vary greatly in size and include delivery cars and large trailers that carry nearly a train carload of butter and eggs at one time.

Missouri Tightens Up on Bidders' Check Practices

The following notice to contractors was issued by the Missouri State Highway Commission on August 4:

Recently we have had a good many cases where a contractor has bid on a number of projects or combinations of projects in one letting. In submitting said bids the contractor has supplied a number of checks, either cashier's checks or certified checks, attaching them to one proposal and making reference to the other bids submitted.

The checks are for amounts so that they could not be attached to any one proposal to adequately cover a particular bid. This feature has caused considerable confusion as the sufficiency of the checks cannot be determined at the time of opening the bids, and in several cases a final check-up has disclosed the fact that the checks submitted with a number of bids have been noticeably short of the required amount.

Therefore, we wish to advise that effective our letting of August 14th, it will be necessary that you fully comply with Section B-8 of the Standard Specifications in that a certified check or cashier's check, for at least five per cent of the bids, must accompany each proposal submitted for a single project or combination of projects as the case may be.

Please do not overlook this matter as any bids submitted which are not accompanied by the proper checks will not be considered.

Average Construction Costs of Concrete Pavement in New York State

The Division of Highways of the State of New York Department of Public Works reports that during the calendar year 1935 a total of 117.64 miles of old pavement was replaced with one-course concrete—all laid under contract. The totals of these contracts, classified according to the number of lanes width, were as follows:

Miles	Width	Total Cost	Cost Per Mile Incl. Grading
71.57	2 lane	$2,845,302.50	$ 39,755.52
43.63	3 lane	2,460,736.68	56,400.11
2.39	4 lane	325,342.82	136,126.70
.05	6 lane	14,347.20	286,944.00

Ten feet is the standard width of a lane, but there are some 8 ft. lanes and some 9 ft.

Pavements not more than 20 ft. wide have an average thickness of 7½ in. Pavements 30 ft. or more in width are 8 in. in average thickness.

The major subdivisions of cost, exclusive of engineering and other overheads, are given in the table below. The item grading includes the removal of all old pavement.

Costs for 16 Years

For the 16 years, 1920 to 1935, the same Division reports average costs of contracts as follows:

Year	Miles	Average Cost Per Cu. Yd. of Pavement Including Cement and Steel Reinf.	Average Cost Per Mile Pavement Only	Average Cost Per Mile Pavement Complete
1920...	67.60	$17.85	$26,382	$31,569
1921...	68.09	15.00	25,012	30,134
1922...	65.01	13.62	22,905	27,945
1923...	136.24	15.09	32,010	39,538
1924...	169.67	15.65	32,808	42,179
1925...	216.33	15.38	33,389	44,238
1926...	241.94	14.56	35,782	47,570
1927...	312.04	12.04	36,259	48,957
1928...	334.37	12.90	35,689	49,658
1929...	317.05	11.76	35,083	48,971
1930...	383.92	11.49	35,683	49,264
1931...	454.10	10.08	29,673	42,900
1932...	200.99	7.97	21,446	30,452
1933...	227.395	9.45	27,095	37,987
1934...	129.20	10.02	29,877	45,399
1935...	117.64	9.89	28,559	47,757

The mix during these 16 years varied between 1:1½:3 and 1:2:4. Pavement thicknesses varied from 5 in. to 8 in. During recent years there has been a tendency to increase the amount of reinforcement per cu. yd.

Items	Quantity	Quantity Per Mile	Total Cost	Cost Per Unit	Cost Per Mile
Concrete pavement (excluding cement and steel reinf.	339,626 cu. yd.	2,886.99 cu. yd.	$1,626,282.59	$4.788 per cu yd.	$13,824.23
Cement	590,325 bbl.	5,018.06 bbl.	1,312,674.95	{ 2.224 per bbl. { 3.865 per cu. yd.	11,158.41
Reinforcement Cement factor—1.7382			420,742.59	1.239 per cu. yd.	3,576.52
Total cost concrete pavement complete.			$3,359,700.13		$28,559.16
Grading, foundation and miscellaneous items			$2,258,397.06		19,197.53
Total cost complete			$5,618,097.19		$47,756.69

Driver Responsible for Majority of Traffic Accidents

A study of accidents in Oakland County, Michigan, during 1935, compiled by the Michigan highway planning survey from state police records, revealed that nearly 80 per cent of the 949 accidents occurring in Oakland county last year were attributed to incautiousness, inattention, and inconsideration. Only 3.1 per cent of the cars involved in the reported accidents were found to be defective and in nearly every case the highway was straight, weather fair, and light conditions normal.

Studies similar to the one in Oakland County will be carried out for other counties of the state. They are a part of the general highway planning survey being conducted by the state highway department in cooperation with the United States Bureau of Public Roads. The survey also includes a road inventory, traffic count and financial study. WPA workers are employed in the accident study as well as on the other phases of the project.

More than 58 per cent of the accidents were reported at intersections.

The 949 accidents reported in Oakland County caused 103 deaths, and injuries to 1,067 persons. Included in this toll were 237 pedestrians of whom 32 were killed and 205 injured.

The Oakland County accidents occurred on the following time schedule: 5.3 per cent of them between 6 and 9 in the morning, 7.2 per cent between 9 o'clock and noon, 10.4 per cent from noon to 3 in the afternoon, 16.6 per cent from 3 to 6 p. m., 23.4 per cent from 6 to 9, 16.9 per cent from 9 to midnight, and 19.0 per cent from midnight to 6 o'clock in the morning.

The increase in volume of traffic which occurs through the day is believed to account for some part of the steady increase in these percentages. However, that the cumulative effects of fatigue undoubtedly play an important part in making the afternoon and evening hours the most hazardous.

Nearly two-thirds of the accidents on which this study was made took place in Pontiac or neighboring urban centers. Of these, twice as many occurred in residential as in business sections.

Special studies of accidents on sections of trunkline highways in Oakland County reveal conditions differing only in degree from those in the city. On US-10 and US-24, which carry traffic of a distinctly urban character, conditions are shown to be approximately like those in the county as a whole.

On US-16, however, where traffic is more characteristic of the normal trunkline, there are important differences. For instance, darkness and wet pavement appear more frequently as elements of danger. Due to the flow of traffic in and out of Detroit in the morning and eveing as well as to heavy truck traffic at night, hazards are greatest between 6 and 9 p. m. with a long danger period from midnight to noon.

International Trucks
handled 80 per cent of the heavy hauling at
Boulder Dam

IN 1931 Six Companies Inc. began the building of Boulder Dam. Today the tourists look down in awe as they ride a highway 730 feet above the Colorado River bed. The finished barrier blocks the canyon. Boulder, world's greatest dam, stands complete—*two years ahead of schedule.*

The certificate of appreciation presented to International Harvester by Six Companies Inc., and reproduced here, is a reminder of the service rendered by International Trucks in this celebrated project. Other equipment of this engineering age also played its part, but to Internationals fell the major share of the heavy hauling.

We ask the construction industry and all users of trucks to note that the number of Internationals at Boulder Dam practically doubled all other heavy-duty makes combined—outnumbered any other single make in excavation service *by more than five to one.* The great fleet of International Trucks handled 80 per cent of the heavy hauling, accounted for something like a million loads into and out of the canyon, performed brilliantly from start to finish in the fifty months of Herculean action in the building of Boulder Dam.

International Trucks, from Half-Ton to powerful Six-Wheelers, serve all hauling needs. Chassis prices $415 up, f. o. b. factory. Low time-payment rates apply on all models. Company-owned branches and dealers at your service.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
606 S. Michigan Ave. Chicago, Illinois

Boulder, world's greatest dam, as it now stands complete in the canyon of the Colorado. Before construction began, millions of yards of rock and earth were removed. Now, nearly 6,000,000 barrels of cement and 60,000 tons of steel and other metals form the barrier impounding a lake with an area of 227 square miles.

AN APPRECIATION
OF
SERVICE ACHIEVEMENT
TO
INTERNATIONAL HARVESTER COMPANY
IN RECOGNITION OF ITS CO-OPERATIVE CONTRIBUTION TO THE CONSTRUCTION OF BOULDER DAM - 1931 TO 1935 IN THE SUPPLY OF
TRUCKS
PRESENTED BY
SIX COMPANIES INC.

NOW—*at* BONNEVILLE

In evidence of lasting quality and stamina, veteran Boulder Internationals are working today in the making of Bonneville Dam, on the Columbia. This illustration shows a new 5 to 10-ton International Model A-8 at Bonneville.

INTERNATIONAL TRUCKS

Highway Safety Closely Related to Diversion of Highway Funds

By A. H. HINKLE

Director, Kentucky Rock Asphalt Institute

MUCH is now being said concerning highway safety. One needs only to look at the accident statistics to be convinced that it is a proper subject for discussion. However, few people recognize the close relationship between highway safety and the diversion of highway funds.

The motor vehicle has been taxed heavily and there is little indication that this will be relieved in the near future. When the gas tax was first mentioned, not many years ago, a terrible wail went up because it was described as an unfair tax placed upon the motor vehicle. However, by the use of funds thus raised it was soon recognized by most intelligent people that it was not only a fair and just tax when the money was used for building roads to accommodate the new form of traffic, but it soon became apparent that it was the only practical means of financing extensive improvements. The improved roads built and maintained by the revenue secured from the motor vehicle invited more vehicles, and soon the funds mounted up to large sums.

However, the large amount of funds accumulating from this source soon put this industry in the same position that a well advertised newly-rich family finds itself in the eyes of kidnappers and other designing members of society, wherein they begin to plot to take the money away from the men who have it.

In spite of the relatively large highway funds secured from the motor vehicles, the development of the automobile has far out-distanced the development of the highway. The streamlined cars with their higher speeds demand wider highways, flatter curves and greater sight distances for safety. Even some types of surfaces which were considered suitable for the slower speed traffic are entirely out of date for the safety of the higher speed traffic. The funds for highway improvements have been far below what was necessary to correct all these defects in our earlier constructed highways.

Because of this failure of highway development to keep up with the development of the automobile, accidents resulting from the hazards of our highways have mounted rapidly during the last decade. Not only do more nonskid surfaces help prevent accidents, but wider shoulders, flatter ditch slopes, shallower ditches and greater sight distances are major factors in contributing to safer transportation by highway. The higher speed vehicles must have wider surfaces and bridges on which to travel with safety. Many of the old roads and bridges can be rightfully called one-way tracks, as they will safely accommodate the high speed traffic only one way. Railroad companies formerly operated heavy two-way traffic on one track, turning one train out on a siding as the other passed. Because of the failures of their signal system and the deficiencies of their engineers, this proved to be a hazardous system when the traffic became heavy; also it greatly delayed the traffic. While motor vehicle traffic is not confined to an exact track, almost the same principle applies when trying to race heavy, high-speed, two-way traffic on a narrow road.

It is probably not far out of line to say that in many, if not most states the automobile is ten years ahead of the highway development. At present rates of development the highway is making slow progress in catching up, and is actually losing ground in many places.

It is readily seen how the diversion of highway funds to other purposes has postponed the proper development of the highways to accommodate the higher speed and increased traffic. Hence it will be recognized that such diversion of funds is closely associated with the highway accident problem.

Sometimes designing politicians, by appealing to the sympathy of our citizens in the name of education for the children, have pried these funds and turned them into another channel. This broke the ice for diversion of funds, which then was followed by diverting the funds for almost any other purpose that could be mentioned.

When one travels over some of the roads in those states where diversion has been on a large scale, and observes the poor and hazardous condition of the roads, he can more readily appreciate what this means to the development of a state. It is a well known fact that our civilization of today is closely associated with the development of the transportation system of any community. It is most encouraging to observe mountainous districts, where society was at its lowest status, coming forward at a rapid rate when good roads enter them. No one thing contributes more to educational system in a state than an abundance of good roads. Hence the diverting of highway funds for alleged educational purposes is not well founded.

Certainly the motor vehicle ought not to be assessed any more than its pro rata for general revenue. The raising of any additional funds from this source for general purposes, whether educational or otherwise, is an imposition that cannot be justly defended, unless perchance some emergency arises and these funds are transferred for a temporary use.

Safety on our highways demands regulation of the traffic. The proper signing and marking of the roads, licensing of drivers, testing of defective cars and police regulation of traffic are all necessary to the safety of highway traffic. These are legitimate charges against highway funds and should not be interfered with by diversion of such funds.

The principal theme of this article is safety, and it is pointed out how highway safety is associated with the proper improvement of the road and regulation of traffic thereon, which is directly in proportion to the funds available. If we are to curb the ever-increasing accident and fatality records, it can only be by building safer roads and regulating the traffic thereon. It may be even a greater crime to build a narrow track and invite high speed traffic on it, which may result in crippling children, as well as adults, than to add another course to their school curriculum with money to which they have neither legal nor moral title. The sympathy racket is the most commonly worked one, and ought to be sized up as the most unethical of all schemes to divert funds out of their legitimate channels.

Aside from the safety feature, much might be said about the inadequacy of many of our main roads to carry the traffic that tries to go over them. This is evidenced by the forbidding of trucks to use the main highways on week-ends in Wisconsin, and the badly congested highways in many places. This is another subject than the main theme of this article and will be left for a future discussion.

ADVERTISING PAGES REMOVED

SECOND ANNUAL MONTANA BITUMINOUS CONFERENCE

By E. B. DONOHUE

Assistant State Highway Engineer, Helena, Mont.

Many Glacier Hotel Where the Conference Will Be Held. Photograph Is from Glacier National Park

THE Second Annual Montana Bituminous Conference will be held at Glacier National Park at the Many Glacier Hotel on Sept. 8th, 9th and 10th. These days fall immediately after Labor Day, this time of the year having been chosen so that those who wish may come a few days early and enjoy the splendors of this magnificent park.

We have constructed more than 2,000 miles of various types of bituminous surfaces in Montana in the past two or three years and we know that most of the western and central states are, at this particular time, greatly interested in the construction of low cost, dustless surfaces. Frankly, when we held our first Conference in 1935 at Butte, we did not think that there would be nearly as much interest as was shown at this meeting. The success of the first Conference was due to the splendid cooperation given us by the representatives of the fourteen states and the Province of Saskatchewan who attended. We were fortunate in securing some of the most widely known and recognized leaders in the bituminous industry.

We are particularly fortunate in 1936 in having secured the Many Glacier Hotel in Glacier National Park. The hotel company have agreed to furnish meals and lodging at the very reasonable rate of $6.00 per day. The rooms will be in suites, occupied by two people to a room, with a common bathroom for every two rooms.

It was the consensus of opinion at last year's Conference that the greatest benefit was received from the discussions. With that in mind, this year we will have but four papers presented at the Conference. Three of these papers are to be an analysis and summary of a number of papers to be prepared covering the work in certain localities or groups of states. The summary is to be made so that a paper will be given by the chairman and will take about one hour to give.

Of the four papers we will first consider the three that will be given by the chairmen. The first paper will be on the "Developments and Fundamentals of Successful Bituminous Practice"; second, "Developments in Practical Design and Construction of Bituminous Surfaces"; and the third on the "Maintenance of Bituminous Surfaces."

A man from one state in each group will prepare a paper on one of the three subjects and these papers will then be submitted to a general chairman for the analysis and summary. Under maintenance we will attempt to cover reconstruction, shoulder maintenance, subgrade under the mat, surface maintenance and seal

coating. Under construction, any new developments and conclusions that have been made or reached since the 1935 Conference. Under fundamentals, we will cover the same subjects as the 1935 Conference, plus a review of analytical engineering methods as applied to bituminous construction.

There would be, therefore, 21 papers prepared by representatives from the states by groups and three papers prepared by the general chairmen. At this time the greater part of the assignments for the preparation of these papers have been made as follows:

"Developments and Fundamentals of Successful Bituminous Practice"—Chairman: Professor F. C. Lang, Engineer of Tests, Inspection and Research, Department of Highways, Minnesota; Group 1: Mr. C. F. Ramey, Assistant Chief Chemist, Standard Oil of California; Group 2: Mr. Levi Muir, Materials Engineer, State Road Commission, Utah; Group 3: Mr. N. W. McLeod, Research Engineer, and Mr. H. R. MacKenzie, Chief Engineer, Department of Highways, Regina, Saskatchewan; Group 4: Mr. J. W. Kushing, Research and Testing Engineer, and Mr. J. G. Schaub, Assistant Construction Engineer, Highway Department, Michigan; Group 5: Mr. A. E. Stoddard, Assistant Engineer of Materials and Tests, Iowa; Group 6: Mr. H. Allen, Materials Engineer, Mr. L. L. Marsh, Assistant Maintenance Engineer, and Mr. J. R. Benson, Assigned to Bituminous Research, Kansas.

"Developments in Practical Design and Construction of Bituminous Surfaces"—Chairman: Mr. N. F. McCoy, Highway Engineer, Bureau of Public Roads, San Francisco, California; Group 1: Mr. Don Bourne, The Asphalt Institute, Olympia, Washington; Group 2: Mr. W. A. Norris, Past President, Wyoming Engineering Society, Cheyenne, Wyoming; Group 3: Mr. J. N. Roherty, Research Engineer, State Highway Commission, North Dakota; Group 5: Mr. F. V. Reagel, Engineer of Materials, Missouri State Highway Commission; Group 6: Mr. F. S. Gilmore, The Asphalt Institute, Kansas City, Mo.; Group 7: Van T. Moon, Chief Engineer, Oklahoma Highway Department.

"Maintenance of Bituminous Surfaces"—Chairman: Mr. H. G. Nevitt, Manager, Road Oil and Asphalt Department, Socony-Vacuum Oil Company, Kansas City, Missouri; Group 1: Mr. R. P. Newland, Division Engineer, State Highway Commission, Washington; Group 2: Mr. D. L. Cheney, Bituminous Engineer, and Seward Mason, Testing Engineer, Highway Commission, Montana; Group 3: Mr. W. N. Lovejoy, Construction Engineer, and Mr. J. F. Jacobs, Maintenance Engineer, South Dakota State Highway Commission; Group 4: Mr. L. L. Allen, Assistant Maintenance Engineer, Department of Highways, Minnesota; Group 5: Mr. T. R. Perry, Bituminous Engineer, Iowa Highway Commission; Group 6: Professor C. M. Duff, Testing Engineer, University of Nebraska; Group 7: Mr. L. C. Campbell, Materials Engineer, New Mexico Highway Department.

The fourth paper will be prepared by Professor L. D. Conkling, Professor of Civil Engineering, Montana State College. The subject of his paper will be "A Review of Analytical Engineering Methods as Applied to Bituminous Construction." He will bring out in this paper the fact that research is of vital importance in connection with bituminous construction and maintenance, and will consider the research angle in detail, summarizing the theories in connection with bituminous research. This paper will probably be highly technical and will be of particular interest to those who are concerned with research work.

Sponge Rubber Expansion Joints for Bridge and Retaining Wall Construction

Because the new "Express Highway," which is being built in St. Louis by the Missouri State Highway Department, is depressed with various cross streets bridging it, considerable attention has been given to bridge and retaining wall construction both from the standpoint of durability and appearance.

Sponge rubber is being used in expansion joints between bridge piers and retaining walls. This material

Photo by Hileman

Sponge Rubber Expansion Joint Attached to a Bridge Pier Before Pouring of Wing Retaining Wall.

consists of a sponge rubber made especially for this service by The B. F. Goodrich Co., Akron, O. Thicknesses of the rubber, which vary from ¾ in. to 1 in., are determined by the state highway department in writing the specifications for each particular job, and are based on the cubic content of the individual sections of concrete. The thickness of rubber is designed to allow for 50 per cent compression as the concrete sections expand in hot weather. All of the sponge rubber is furnished in a color which matches that of the finished concrete, making the joints as smooth and unobtrusive appearing as possible.

▼

Washington State Good Roads Meeting

The annual meeting of the Washington State Good Roads Association will be held at Ellensburg on October 2 and 3. J. C. Hubbell of Ellensburg, will be the Convention Chairman, assisted by Lou Richards of Ellensburg. Vice-Chairman Frank Guilbert, of Spokane, will have charge of the program.

NEW STREET FLUSHERS OF CINCINNATI, O.

THREE new street flushers acquired recently by the city of Cincinnati, O., are made entirely of aluminum, welded construction, and along very modern stream lines. Each has a capacity of 3,000 gal. They measure overall 27 ft. long by 8 ft. wide and 10 ft. 3 in. high.

Filling Tank from Fire Plug; Rear Doors Open. W. E. Meyer Shown at Left

The all-aluminum tank and fittings insure a minimum of rusting and corrosion. The tank which is 11 ft. 6 in. long is elliptical in cross section, being 94 in. by 68½ in., the major axis of the ellipse being horizontal.

The main tank shell has a thickness of .204 in., the bulkhead .250 in. and surge plates .187 in. respectively. Bulkheads are dished outward 3 in. and are flanged to fit inside the shell, the flanges being 1½ in. and secured to the shell with a ¾ in. weld.

Two longitudinal and four transverse surge plates minimize the surging resulting from rapid acceleration or decelleration.

A 12 in. by 16 in. manhole is located in the top center of the tank shell and there are openings in the surge plates to provide access for cleaning, inspection and repairs. A one-way valve filler plug is located on the right rear of the tank, the valve being opened only by the fire plug water pressure.

These nozzles can be arranged to provide a clean sweeping width of 40 to 50 ft. on a level street. They deliver a flat sheet of water. All piping is of seamless copper tubing. Mueller streamlined fittings are used throughout. The air-operated valves provide a clear, instantly acting, full opening in each of the individual lines.

The tank is held down by six aluminum straps to six equidistantly spaced supporting bolsters cushioned from the tank by ¼ in. belting.

A 6 in. diameter outlet tunnel is provided with a flanged fitting for a standard connection to the piping.

The units each weigh 20,000 lb. empty and carry a live load of 23,000 lb., bringing the total gross load per unit up to 21.5 tons. Biederman Timken 4-wheel drive, tandem axle truck chassis with Timken inter-differential axles, Fuller No. 51 transmission, pneumatic brakes and Hercules RxB motors were used for the mountings. These trucks deliver 4,600 in. lb. of torque. They have 15 ft. 4 in. wheel base. To supply pressure at each of the four spray nozzles, a separate power unit, controlled from the specially designed truck cabs, was installed.

The pumping unit consists of a standard centrifugal single stage and suction type pump, driven by a separate standard gasoline engine. The entire unit is located in the gracefully formed ventilated aluminum tail which is provided with double doors for ready access.

The Allis Chalmers pump, which has a 5 in. intake and 4 in. discharge opening, is provided with a bronze impeller, statically and dynamically balanced, keyed to a 1¼ in. stainless steel shaft, mounted on adjustable ball bearings. The cast iron pump casing is split vertically and provided with close fitted bronze wearing rings around the inlet and rear impeller flanges and has a stuffing box holding 5 rings of ⅜ in. square braided asbestos packing and a lantern ring connected through a suitable passage to the high pressure portion of the casing. Water seal pressure is regulated by an adjustable needle valve.

The gasoline driving unit is a Ford V-8 engine capable of delivering 61 hp. at 2,300 r.p.m. The engine has an electric self-starter, and oil bath air cleaner, voltage control generator.

The capacity of this pumping unit is 600 gal. per minute at a speed of 2,300 r.p.m., producing 80 lb. pressure at the four flusher spray heads.

Control of each nozzle is individually maintained in the cab by remote control pneumatic valves. Any or all nozzles can be operated at will. The nozzles themselves are of cast and machined aluminum, designed for minimum friction losses in pressure. Each nozzle is hung from a packed ball swivel joint also specially designed. Two nozzles are located at the extreme front of the truck, the other two under the cab.

An excellent opportunity to give these new outfits a rigid and practical test run was presented just as the first one was completed. Several areas in the basin of Cincinnati were inundated by the March floods prevalent all along the Ohio River valley. Receding waters left a great deal of debris scattered over streets. As the

New Flusher at Work on Stanley Ave., Cincinnati

waters receded, the first of these new flushers was rushed to completion and pressed into service 24 hours per day. Along each of the waterfronts, the machine was kept busy flushing down a few blocks at a time.

The flushers were designed under direction of W. E. Meyer, Supervisor of Equipment, Highway Maintenance Department of the city of Cincinnati, O. He was aided by Wm. Baker in the final construction of the unit.

Observations by the Way

By A. PUDDLE JUMPER

¶ I wonder if there isn't something yet to be discovered about design of concrete paving slabs. In many cases in Wisconsin, even on new roads, the slab is cracked longitudinally between the center line joint and the edge. The same is true in many places in Illinois. In coming over U. S. 6 across the northern part of Indiana I note that these cracks are non-existent. Why does the slab crack in one state and not in another?

• •

¶ It was nice to drive over that brick paving eastward from the business district of Lorain, Ohio, to the city limit. That is an excellent job. A permanent center line of concrete makes a definite "Life Line." I should think that trucks would be routed over some other street so as to preserve a free flow of traffic on this heavily traveled road, Ohio Route 2.

• •

¶ Stop and Go lights are fine things when judiciously used. I think Columbus, Ohio, has entirely too many. They get to be provoking. I ran into these pesky lights in many, what seemed to me, unwarranted places.

• •

¶ Speaking of Stop and Go lights, Ohio seems to be flooded with them. One is almost inclined to say, "The state of a million 'Stop and Go' lights."

• •

¶ Cincinnati has the right traffic spirit. On the city limits you read the following: "Cincinnati—Drive Carefully." No hint of speed limits of road patrolled.

• •

¶ I get a kick out of the signs on the limits of many of our smaller towns. They read, "Speed Limit, 20 miles per hour, Strictly Enforced" or "This road patrolled, speed limit 20 miles per hour." In driving through the burgh you'd have to get a magnifying glass to find a traffic officer. The signs such as Cincinnati erect are much more effective and drivers are, I believe, more inclined to be cautious merely out of respect for the spirit displayed.

• •

¶ If you want to see poor roads just drive through Ohio. I wonder where they have been spending their highway funds.

Attention, A. Puddle Jumper:

I read your "Observations" in ROADS AND STREETS with a great deal of interest and am taking the liberty of calling your attention to an innovation on the concrete road system of Wayne County which may be of value to other localities.

Instead of erecting signs "Side Road," "Cross Road," etc., near intersecting highways the Wayne County Road Commission is putting up signs equipped with reflectorized buttons, giving the name of the cross road.

These signs are erected 200 feet from the intersection and are very, very favorably commented on by motorists as being particularly useful for night driving.

The head lights of a motor car illuminates these reflectorized signs over a quarter of a mile away:

GREENFIELD ROAD
200 FEET

EDWARD N. HINES.

[Mr. Hines has been County Road Commissioner of Wayne County, Michigan, for the past 30 years.—Editor.]

• •

¶ A burning question—Should the next convention of the American Road Builders' Association be held in Milwaukee or Memphis, or some city in Mississippi or Texas?

• •

¶ A commendable action in association activity was the purchase of patent rights from Beck and Blake, two years ago by the National Paving Brick Association, of their method of preventing brick filler from adhering to the surfaces of brick pavements. The method is now available to all contractors without royalty charges.

• •

¶ A new mineral filled asphalt has been invented for filling brick pavements. Tests are being conducted on several fillers by the engineering experiment station of the University of Ohio and the U. S. Bureau of Public Roads. These agencies are also conducting tests on de-aired brick.

• •

¶ Why did Congress appropriate $75,000 for highway work in Guatemala?

¶ Smooth roads are just as easily made as rough ones, especially in black top surface treatments. It seems to me that engineers overlook the value of pulling broom-drags over surfaces they are maintaining when spreading black top surfacing.

• •

¶ Wanted—A good signing program for Ohio's road system.

• •

¶ Strange As It Seems" I saw a steam shovel on highway grading work last week.

• •

¶ "There oughta be a law"—against so many advertising signs along the roadway. At night a driver misses legitimate instruction signs about curves or stops placed by the highway department because they are surrounded at strategic places, in many cases, by hot dog, 7 gal. for $1.00, ice cold, pale beer, or what have you signs.

• •

¶ My congratulations and compliments to the Indiana State Highway Commission and the Contractor, respectively, on the fine concrete paving job done on U. S. 6 across the northern part of Indiana. If you want to drive on a good road, nicely located, properly engineered, and artfully constructed, drive over U. S. 6 in Indiana. In one place the culverts are too short but I'll bet my hat that will be corrected before long.

• •

¶ Did you see that "Farm to Market Road" exhibit at the Cleveland, O., Great Lakes Exposition? The exhibit is nicely prepared but fails to show efficient road building methods. I doubt that a highway engineer had a hand in preparing it.

• •

¶ In traveling about the country this weather do I hunt for air-conditioned restaurants and coffee shops or not? You guess. Right!

• •

¶ Did you know that the War Department has selected a certain highway net on which it is desired to have construction completed first? I think you will agree that the priorities shown on the department map are necessary for National defense and should be given priorities as indicated.

¶ A word of appreciation to East Liverpool, Ohio, from an occasional traveler through the town. The mention of East Liverpool always conjured rough brick pavement to my mind. The two were inseparable. You can imagine the satisfaction felt on my last trip in going through the town on U. S. 30 to note the smooth, clean brick pavement for the whole distance. They should send an emissary now over to Chester, Pa., and get that town to follow their example. I was so pleased at the transformation that I turned around and went over the streets again.

• •

¶ On U. S. 30 through Pennsylvania. To the tune of "Gone Are the Days."

Gone are the days, when my heart
jumped in my throat;
Gone are the days of the crooked
mountain roads,
Gone are the days when the curve
bent sharply back,
Hairpin and hook style bends are
gone with
Steep grades too.

• •

¶ The signing of main routes through Pittsburgh, Pa., is very poor. The signs are placed so high upon poles that automobile lights never strike them. The through driver easily misses his route if he misses just one of those elevated signs. Why not make a WPA project for correcting these poor signing conditions?

• •

¶ If it takes a gallon of paint to cover a roof what is a good day's work laying paving brick? Jim Brown, an Indian employe of a St. Louis construction company, uttered a disgusted grunt when he was told that Ben Williams, a negro WPA worker, beat his brick laying record. Williams laid 36,519 paving bricks in 7½ hours for a new record at Kewanee, Ill. Brown claims the world championship title for laying 40,496 bricks in eight hours the other day, and the temperature was 106 degrees. Brown's partner, Forest Dugan, worked right alongside of the Indian champion. The two men kept a shift of 12 men busy most of the morning carrying bricks to them; twelve additional men take over the afternoon shift. The bricks weigh 7½ pounds apiece. You calculate the tonnage per day. It's too heavy for me. Contractors regard 15,000 brick a good day's work.

¶ Maryland was a pioneer with Ohio in paving. Now, however, she has fallen by the way in keeping up with traffic requirements. Most of her roads that I have traveled, except possibly a short stretch on U. S. No. 240, are antiquated, out of date, rough, narrow and unsightly.

• •

¶ Is Maryland saving state route No. 27 around Damascus between U. S. 40 and U. S. No. 240, as an example of how bad a surfaced road can get? It's terrible. I gained the impression that not five cents has been spent in maintenance on this stretch in five years.

• •

¶ Engineers of the Maryland State Roads Commission enjoyed a day of outing at the Forest and Stream Club. Dr. Tabler, chairman of the commission, kept events running fast and smooth. Ask Mr. T. H. McDonald or Mr. C. M. Upham what they thought of the first prize awarded to Mr. Carrington for the best score in trap shooting. In keeping with the character of the contest the prize represented a type of rapid shooter that hits the mark each time it shoots. Joe Cheney, district engineer from the southern part of Maryland, won the badge as "The Champion Liar" and also acted as toastmaster. Chicken-a-la-Maryland along with beer and soft drinks was served. Dr. Tabler is breaking the way for a rejuvenated, modernized state highway system.

• •

¶ It's been so long since Mr. T. H. MacDonald, Chief of U. S. Bureau of Public Roads, looked down the barrel of a level or transit that he missed some shots in the trap-shooting contest at the field day gathering of the Maryland Roads Commission engineers, Saturday, July 25, 1936.

• •

¶ Much praise and credit is due to the Pennsylvania State Highway Department for their excellent engineering on U. S. 30 across the mountains from Pittsburgh to Chambersburg, Pa. I remember my trip over this route in 1923. All of those hairpin inside and outside curves are gone. The road now is wide and most cars negotiate the mountains in high gear. My four cylinder 1932 Plymouth could "ping" its way to the top of all but the mountains.

¶ Just southeast of Toledo, on Ohio Route No. 102, I noticed two state maintenance department trucks parking crosswise of the oncoming lane. They had been headed in my direction. The drivers jumped out in a rush, grabbed their shovels and tore over the tracks of the Lake Shore Electric Railway Company, which ran along the north side of the paving here. Other car drivers were stopped by the trucks and the men jumped out, also. A grass fire was eating into a farmer's uncut, dried field of oats. It had gotten a good start. Were it not for the quick action of the state highway maintenance men the farmer would have lost his whole season's work because the wind was blowing the flames across the field. Honorable Mention for these men, Mr. Carl Wahl, Chief Engineer, State Highway Department.

• •

¶ Noticed on a safety council sign erected by the governor of Pennsylvania the following:

"Children Should Be Seen and Not Hurt." Pretty good, I think.

• •

¶ An important question uppermost in the minds of manufacturers of highway equipment now is, "What is the trend in equipment? Is it toward larger or smaller units of equipment?" Seems to me that the answer to this question lies with road and street maintenance and construction engineers, as well as in the funds to be made available for future road work. In grading equipment, for example, it is a matter of whether or not the trend is toward flatter grades and wider cuts or not. I'm inclined to think that the economic units are not the large digging or hauling ones but the medium size and smaller ones.

• •

¶ Speaking of WPA projects—that backslopping and gutter stone paving work west of Pittsburgh is quite commendable. Not the least important part of this improvement is the increasing of sight distances around the curves.

• •

¶ Can you match this or even go it one better? Just east of Bedford, Pa., the state highway department is relocating and rebuilding a stretch of new wide concrete road. In crossing the mountain stream they built an open spandrel reinforced concrete arch bridge on a curve, on a grade, super-elevated, and on a skew. What can you offer to beat this?

EDITORIAL

Where Will the Next Roadbuilders' Convention Be Held?

Selection of a place for holding the next annual convention of the American Road Builders' Association is developing into a question fraught with complications. The act of selection in itself is a simple matter. All that is necessary is for the executive committee of the association to say they will hold it in such-and-such town. But for them to say that is where the difficulties arise. Several places have bid for the convention. Among them are Milwaukee, Memphis, New Orleans and the State of Mississippi. Also there is a cordial invitation from Cleveland stating that if it is selected the city will take care of those attending.

Milwaukee feels that since the Road Show has never been held there and that since so many road equipment manufacturers are located there that the next convention, probably next January, should be held in that city. Their appeal is on the grounds that there are forty road equipment manufacturers in Milwaukee and vicinity, many of whom are financial supporters of the association.

On the other hand, the South appeals for the convention on the grounds that the Road Show has never and probably never will be held in a southern city. Besides, they claim that they represent, as a whole, a considerable buying power for road equipment. Along with these arguments they point to the big road programs in Mississippi and Texas; they cite what has been and is being done in Louisiana. Many other southern states need a stimulus to start road building programs. If the holding of the next A. R. B. A. convention in, say, some city in Mississippi or Texas will be any inducement to the counties of Alabama or Georgia, or Mississippi, to standardize their county organizations and prepare legislation for establishing competent engineering supervision of county road work, then there should be no doubt as to where the convention should be held.

Since there is not much probability that a Road Show will ever be held in the South, due to extra freight costs for shipping equipment, we believe they should be given quite a bit of consideration. Besides, think of the nice swimming in the Gulf of Mexico at Biloxi or Gulfport. Think of the warm weather south of the Ohio River in January. If the convention goes South we prefer Memphis to New Orleans but would rather see a city in Mississippi or Texas honored. There are many cities in both of these states that could handle the convention crowd. We understand that the prevailing opinion of the executive committee of the A. R. B. A. is for a southern location.

We know that if Milwaukee loses the convention they will pat the winner on the back and say, "See you at the Roadbuilders' convention in ———."

Federal Funds for State-Aid to Counties

On occasions in the past reports have been rendered and studies made of county highway administration, county highway finance, county highway construction and maintenance, and the financial relationship of state and county. These reports and studies have been both specific and general, i.e., reports have been rendered on highway administration in specific counties and recommendations made for administration of funds on roads in those counties, while other reports and studies have considered the county highway improvement problem along with administrative duties of other county officers. Still other studies have been devoted to generalizations and theoretical applications of various methods of handling the improvement of roads in counties. Committees of citizens have rendered reports, various committeees of the American Road Builders' Association have submitted reports at the annual conventions, the U. S. Bureau of Public Roads has studied the problem but has not released a report, the division of governmental research of the Brookings Institute has compiled reports on several states in which the county road problem has been discussed in each case, the staff of Roads and Streets has made studies of certain phases of the county highway improvement problem, consulting engineers have rendered reports for county clients, and individuals have written about the question either as a separate subject or in conjunction with county administration as a whole. It is doubtful if recommendations in any two of these studies are alike. That is reasonable, normal and to be expected. Why? Because the laws in no two states are alike and the traditions and political conditions in no two counties are alike.

However—there is a common denominator to the kaleidoscope of methods and procedures for administration of county road improvements. That common denominator is the dollar. In some shape or form the dollar enters the picture in a big way. The recent congressional authorization of millions (how easy we say that word now-a-days) of federal dollars to aid in the improvement of farm-to-market roads has brought the question of administration of county funds to the front. (We doubt if half the county officials really know about the authorization.) There are basically two methods for the administration of those funds. They are:

1. Complete county administration.
2. Complete state administration.

The county unit plan, advocated by some county engineers, is a fair exemplification of the first method. The plan in use in North Carolina is a fair example of the second method. In our opinion, neither one of these is satisfactory. Therefore we advocate a state-aid plan, i.e., a plan whereby the states aid the counties in somewhat the same way that the federal government aids the states

Prerequisities of this plan are a competent engineering staff in the county or group of counties, standards of design to be established by the state highway departments, reviews and approval of plans and specifications by the state highway departments, and general supervision of expenditures. In short, the relationship between the county engineer and the state highway department would be in the nature of the relationship between the supervising engineer of a project and the consulting engineer where the latter has control of the expenditure of funds.

Rules and regulations, which the U. S. Bureau of Public Roads is now writing, governing the allocation, supervision, and expenditure of the farm-to-market federal funds are likely to become the background for future county road administration policies even when federal funds are not involved. That is easily understood. It is merely a trait of human nature to follow automatically or involuntarily, a method or procedure which has been established. In writing the rules and regulations too strong a leaning toward basic method number two, above, can easily obtain. It is suggested that the Bureau of Public Roads prepare the rules with the method of administration as practiced in Iowa constantly in mind.

This whole picture of rural highway improvement is loaded with dynamite if a too autocratic, superior type of supervision is established. Why? Because the state legislators are elected from the counties. If the county officials in a particular state organized and decided that they wanted to spend funds collected within the state on county roads through their county highway administrative setup, they could easily do it. All they would need to do is instruct their state legislators to that effect because they represent, politically, the basic elective unit. True, they probably would not receive aid in the way of federal funds if they ignored the state highway commission, but the condition represents one possibility that could easily become a probability if county organizations are not given considerable latitude in the selection of location, type of design, and reasonable supervision of expenditures on county road improvements.

A state-aid method of administration, therefore, is the practical solution to the county rural road improvement problem. A county which may be too small to provide enough revenue to support a competent engineering organization could ally itself with another or several other counties for road administrative matters, yet retain its entity as an independent elective unit. The county has become a definite thing in the United States, a thing with traditions, habits, and history different from other counties nearby.

Hypothetical or theoretical rearrangement of areas into larger counties can be and has been discussed in many quarters and proposed, but actually changing those areas by consolidation is next to impossible. Therefore the practical way in which to establish competent engineering supervision over county road improvement for counties that are individually financially unable to support an engineering organization is for those counties to form a voluntary alliance for road administrative purposes only.

State-aid with federal funds can then become an actuality and local people will feel they are having a part in the improvement of their local county road systems. Under no conditions do we recommend federal grants direct to counties without consulting supervision by the state highway departments. We do, however, believe that considerable voice in location, design, and technical phases of the improvement should rest with the counties. Furthermore, in all cases, a rigid principle of construction by contract should be employed.

▼

This Is an Important Period of Transition

(An Editorial in *Florida Public Works* for July, 1936)

We are experiencing today an era of change.

It is one of those situations that we face periodically.

It involves the life of every citizen, every business man, every worker, everyone who has even the smallest part in today's affairs.

Every man, whatever his position in life, is thoughtfully taking inventory of what is ahead; of what changes will influence his life; of what good or what evil will come of these changes.

The job of building, maintaining and administering highways is vitally involved in this situation. The vision of a seer is not required to see forces at work that would divert still more of the already inadequate highway funds for a myriad of purposes. Unless public sentiment is consolidated to repulse raids upon road funds, there will be more tendency to dip deeper into them for a multitude of general purposes.

President Roosevelt has signed the agricultural appropriation act for 1936 setting aside specific funds for federal aid highways. The President also has signed the Hayden-Cartwright act of 1936 authorizing a total of $476,000,000 in federal-aid highway funds for the fiscal years of 1938 and 1939. These two measures, plus provisions for highway and street construction together with other funds made available constitute a three-year program in excess of $1,500,000,000.

But federal funds cannot be expected to flow freely forever. The President has announced that States must make plans to assume financial responsibility for many of the conditions these national appropriations are designed to remedy. And already the government imposes sharp penalties upon any State that increases the diversion of its own highway funds.

Now is the time to start building sentiment against the misuse of highway funds. An incessant campaign of public education in highway economics is needed. The people must be made to understand that there would be no improvement of roads without funds derived from gasoline taxes. An informed public would defend these funds. Given a direct opportunity, with all facts known, the people would vote to end the unjust practice of diverting highway funds for other purposes.

Perhaps it is well that we are experiencing an important era of change. Periods of transition compel people to think, furnish the motivating impulses that make for progress. When everything goes smoothly, we become complacent. Periods of change arouse us to action. Maybe the present one will spur us to do something about highway funds.

▼

MICHIGAN STATE HIGHWAY MAINTAINS TRUNKLINE HIGHWAYS IN 40 COUNTIES.—The State Highway Department of Michigan now maintains trunkline highways in 39 counties of the state. Maintenance in one other county was taken over on July 1. In the 43 counties where the State Highway Department does not exercise direct maintenance the county road commissions maintain the roads under contract with the department.

NEW EQUIPMENT AND MATERIALS

New Diesel Tractors

New Model "KO" and "LO" controlled ignition diesel fuel tractors have been announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis. An "LO" is shown in the picture pulling a 7-yd. self-loading Continental scraper.

According to Allis-Chalmers engineers, features and improvements have been included in the new models that will enable users to get a maximum of diesel fuel economy combined with a simplicity, smoothness and balance not found in the compression ignition type tractor.

A new type of fuel pump, a simplified injection system and

Model "LO" Pulling 7-Yd. Self-Loading Scraper

new cylinder heads are a few of the improvements on the new models.

Controlled ignition is another outstanding feature of Allis-Chalmers diesel fuel tractors. Firing takes place at exactly the proper point, assuring complete and efficient combustion and eliminating power wasting pre-ignition. Due to the fact that high compression pressures are not present in the controlled ignition tractor, high tension rings, specially compounded lubricating oils, excessive weight and destructive vibrations are eliminated.

The Model "KO" develops 49 hp. and the "LO" 79 hp.

▼

Truckair Compressor

The Sullivan Machinery Co., Michigan City, Ind., announces a new compressor unit designed specifically for truck mounting with power take-off from the truck propeller shaft to utilize the truck engine for drive. The compressor is two-stage air-cooled

New Sullivan Compressor Unit

with capacity of 105 C.F.M. delivered—enough to operate a large rock drill or two pavement breakers.

Features stressed are force feed lubrication, anti-friction main bearings, automatic control and small squace requirements, so that major part of truck space can be utilized to carry men, tools and materials. Of special interest to gas companies is the special vacuum hood which also permits vacuum cleaning of service lines.

New Stationary Compressor

The Sullivan Machinery Co., Michigan City, Ind., announces a new stationary heavy duty air and gas compressor of the single stage, single cylinder, double acting horizontal type, built in sizes from 10 to 50 hp. and for pressures from 5 to 150 lb. Advantages claimed are long life, low power cost and fully automatic operation. Features stressed are Timken double row main bearings. replaceable cylinder liner and crosshead guide, tinned piston and crosshead, streamline long life valves.

▼

Diesel Tractors in Thrilling Movie Role

Joe E. Brown, world-famous comedian, is teamed with Diesel track-type tractors in Warner Brothers latest motion picture release, "Earthworm Tractors." This side-splitting feature of thrills and laughter is now showing in hundreds of theatres, and will soon appear on foreign screens.

"Earthworm Tractors" is the screen version of the series of stories by William Hazlett Upson in a leading weekly magazine. Brown plays the role of the super-salesman hero, Alexander Botts. Opposite him is lovely June Travis as Mabel Johnson. Guy Kibbe is Cyrus Johnson, her father, who is Botts' most stubborn prospect.

The series of hair-raising and impromptu tractor demonstrations that mark the progress of the plot, eventually win the girl and a sizeable tractor order from her father. And while Brown enacts his role of "natural born salesman," the tractors are proving themselves able performers, too. All tractors in the picture are "Caterpillar" Diesels, and during the filming, the Caterpillar Tractor Co. plant at Peoria, Ill., was taken over by Warner Bros. cameramen for days.

Director Raymond Enright and screen writers, Richard Macauley, Joe Traub and Hugh Cummings, vied with one another in arranging spectacular and difficult feats for the

Alexander Potts (Joe E. Brown) Hooks on to the Johnson House Preparatory to Moving It Across Town

tractors to perform and the Diesels nobly responded, according to machinery men critics interested in the technical side of the picture. In one sequence, a 16-ton Diesel tractor plunges into a man-made swamp. Driverless, it breasts through the deep mire; wrecks a truck, smashes through a fence, crashes over logs and rocks, and ends its sensational flight by hurdling an automobile. In another scene Super-salesman Botts, who "knows all about tractors," but little about the gear shift, demolishes a railroad station

The climax comes when Botts takes his prospect along a precipitous mountain trail. Workers are blasting to improve the road. Again the Diesel performs herculean feats amid dynamite charges and avalanches of rock. However, members of the Warner technical staff said the machine emerged undamaged with the exception of scratched paint.

Joe E. Brown attended the world premiere of his picture at Peoria, Illinois, July 14. Thirty-five thousand fans gathered around the theatre to welcome him. Newspaper critics at the affair declared "Earthworm Tractors" to be "Brown's best."

Neon Flashing Signal for Road Construction

A flashing neon warning signal that can be used by contractors to indicate road construction has just been developed by the Blatchford Corporation, 713 Railway Exchange Building, Chicago. It is stated its bright red or orange flashes can be clearly seen at night from distances greater than one mile. The unit is operated by a 1½-volt dry battery and, as it is completely self-contained, it requires no external wiring. Thus it can be used anywhere and can be readily moved from place to place.

A—Blatchford Portable Type Flashing Signal Equipped with a Flashing Bull's-Eye and Fireball Reflecting Buttons. B—Blatchford Railroad Warning Signal, to Be Located from 200 to 250 Feet from Railroad Crossing.

The 1½-volt hexagonal dry battery, which is built into the base of the sign, is capable of operating the flasher 24 hours a day for 120 to 230 days or more. The current cost varies from only ½ to 2 cents a day. When the signal is turned over on its side, the switch in the base disconnects the flasher.

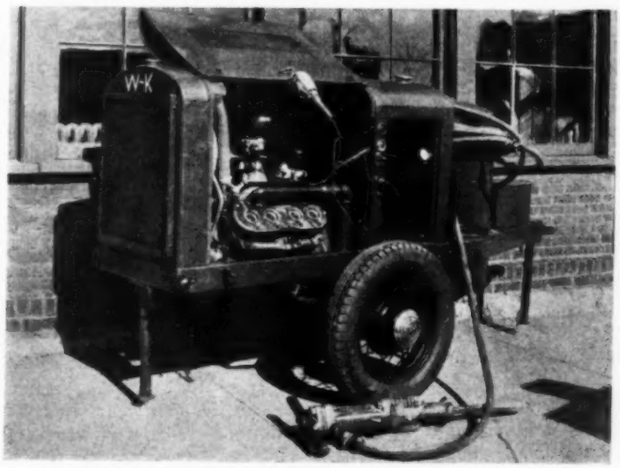
In addition to the portable warning sign, the Blatchford Corporation has brought out a complete line of road and street flashing traffic signals with a permanent mounting base. Both the portable and permanent signals can be furnished with all types of standard approved street and highway signs. They are available in three basic forms: with flashing neon letters and flashing neon bull's-eye; with flashing neon letters and red reflecting bull's-eye; and with flashing neon bull's-eye and Fireball reflecting buttons on the lettering.

▼

New Compressor Unit Utilizes Ford Engine

In a new air compressor unit just placed on the market by Wenzel-Kenney Machinery Co., 229 Southwest Blvd., Kansas City, Mo., one side of a Ford V-8 engine operates as a motor while the other side is converted into an air compressor by a special valve and engine head arrangement.

A special feature of the unit is the combination valves (intake and exhaust one inside the other) with the intake cooling the exhaust on the inside and a large water jacket in patented head cooling the exhaust on the outside. It is stated that it requires only a few minutes to take the valves out of the machine, as they are inside a cage that screws in from the top of the head.



Model Single V-8 Showing Compressor Side. Illustration Shows Valve Cage Screwed into Head, Also Air Manifold Fastened on Top of Head Leading to the Receiver

Three models are made: A model Ford engine with two central cylinders compressing the air; Single V-8 with one bank making air and the other furnishing power; and the large Double V-8 with one V-8 engine furnishing the power connected to another V-8 with two Wenzel-Kenney compressor heads producing 104 cu. ft. of air.

It is stated the machine will operate jackhammers, pavement breakers, riveting hammers, concrete vibrators and many other types of pneumatic tools.

▼

New P. & H. ¾-Yard Excavator

The Harnischfeger Corporation of Milwaukee announces a new high-speed, ¾-yard machine designated as the Model 355. Designed as an all-purpose machine, it is built of the new high-tensile steels by electric welding, thereby effecting a considerable weight reduction below that of its predecessor of similar capacity. The frame, for example, instead of unit cast-steel construction, is now welded of structural steel sections with a reinforced cylindrical car body welded integrally with crawler frames.

Model 355 P. & H. Shovel

The new model uses standard tractor crawlers of the type manufactured by the Allis-Chalmers Company. Mobility is one of the outstanding features, together with greater speed and maneuverability. Resiliency in the track gives added protection to the crawlers.

Smoother operation is claimed with helical gears in both reductions of the hoist mechanism, while a live roller circle with hook rollers eliminates any pull on the center pin, thus permitting free swing with the heaviest dipper loads.

All movements in travel and digging have two-speed transmission with a high-speed direct drive. The low gearing which provides a more delicate control is an important feature in crane service for the placing of stuctural steel, etc.

Greater ease of control is obtained through the use of automotive type foot pedals which permit the operator to make the most natural use of his strength. Larger brakes and clutches are provided for faster starts and stops as well as easier spotting of the dipper. The cab is full-visioned, following the lines of the bantamweight machines, and provides space for engine inspection at the rear.

The dipper is of rolled steel, all-welded, with ¾-yard struck measure capacity. The removable dipper teeth, of full manganese steel, are reversible.

The Model 355 is available with light alloy steel attachments for service as shovel, dragline, crane, skimmer scoop, trench hoe and pile driver.

New Tractor Truck for Heavy High-Speed Hauling

A new 40,000-lb. gross capacity tractor truck, designed to meet the requirements for a compact high-speed unit for heavy duty hauling is announced by the Four Wheel Drive Auto Co. of Clintonville, Wis.

The weight distribution of the tractor is 40 per cent on front axle and 60 per cent on rear. The manufacturer states that the new truck with semi-trailer is designed to carry a gross of 40,000 lb. distributed 10,000 lb. on the front axle of the tractor, 15,000 lb. on the rear axle of the tractor, and 15,000 lb. on the axle of the semi.

According to the manufacturer, controlled power, provided by the better distribution of power and load through the use of a center differential and setback front axle, is the key to the truck's

New FWD Model T40

capacity for high-speed hauling. It is stated the tractor can maintain a road speed of 52 miles per hour on the level and due to its four-wheel traction is better able to negotiate the hills. The short overall length and standard wheelbase of 130 in. provides short turning radius and ease of maneuverability.

The 125-hp. motor has displacement of 462 cu. in. and develops 324 lb. ft. of torque. The transmission is of the 5-speed sliding gear type with overdrive and reduction of 7.3 to 1 in direct. Other features of the power line are: 14-in. single plate clutch, transfer case with 5-in. silent chain, center differential and propeller shafts with needle bearing type universal joints. Through this line the power is transferred to the front and rear axles, which are of the full floating type. The unit is equipped with overload springs front and rear. Tires are 9.75-20, singles front, duals rear. Frame height is 36 in.

New Air Compressor

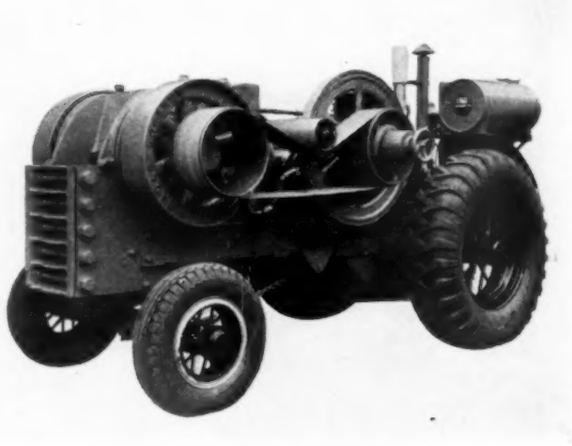
A new light weight air compressor, utilizing the Ford V-8 engine, has been placed in the market by Schramm, Inc., West Chester, Pa. The compressor is built in one size—105 cu. ft. actual air delivery. It is a complete and self-contained outfit with air receiver, radiator, self-starting equipment, hood and side doors. The compressor can be mounted on a Ford commercial body truck. Its weight with skid mounting is 1740 lb.; with 2-wheel trailer mounting, 2,400 lb.; motor truck mounting (less truck), 1,940 lb. The specifications include the following items:

Schramm "Ford-Air" Compressor on 2-Wheel Trailer with Side and Rear Tool Boxes and Double Hose Reel.

Compressor Model No.	105
Cu. ft. Actual Air Delivery at 100 lb. pressure	105
Compressor Bore & Stroke	3 1/16x3¾
Number of Compressor Cylinders	8
Operating Speed of Compressor—R.P.M.	1280
Piston Travel—feet per minute	750
Horsepower Required at 100 lbs. pressure	25
Number of Compressor Crankshaft Bearings	3
Oil Capacity Compressor Sump (qts.)	5
Engine Model (Ford)	V-8
Engine Bore & Stroke	3 1/16x3¾
Number of Engine Cylinders	8
Engine Horsepower at Compressor Speed	32
Percentage of Excess Horsepower	28
Number of Engine Crankshaft Bearings	3
Oil Capacity Engine Sump (qts.)	5
Fuel Tank Dimensions (inches)	23⅛x20x8¾
Fuel Tank Capacity (gallons)	16¼
Model "Oil Bath" Air Cleaner on Compressor	No. 1
Model "Oil Bath" Air Cleaner on Engine	No. 37
Number Air Cleaners on Compressor	2
Number Air Cleaners on Engine	1
Type Radiator Core	Solid
Water Capacity Cooling System (gals.)	9½
Capacity Hose Reel on Two Wheel Trailer (ft.)	100 ea.
Gauge of Hood and Door Steel	No. 16

New Eagle Crusher

A new model "one unit" rock crusher has recently been put on the market by the Eagle Crusher Company, Galion, Ohio. The crusher, 35 HP. motor and heavy transmission built into



Eagle "One Unit" Crusher

one complete unit, having two speeds forward and one reverse, is now offered as a heavy duty roadside crusher. It has a capacity of 6 to 10 cu. yd. per hour, and may be easily adjusted for crushing ¼ in. to 3 in. stone while in operation. It may be equipped with either steel wheels or pneumatic tires and weighs approximately 12,000 lbs.

Universal Atlas to Have 100 Per Cent Electrically-Operated Cement Plant

A 100 per cent electrically operated cement plant will result from the improvement program to start this summer at the Hudson, N. Y., plant of the Universal Atlas Cement Co., U. S. Steel Corporation subsidiary, according to R. A. Dittmar, superintendent of the plant.

The improvements include newest type stone crushing plant with capacity of ten tons per minute; an electrically driven belt conveyor over half a mile long to transport stone from crusher to plant; new limestone storage with capacity of 25,000 tons; completely new grinding equipment for both raw materials and clinker; new Diesel electric locomotive for hauling loaded cars of cement from plant to railroad; installation of modern motor trucks to haul stone from quarry to crusher.

ADVERTISING PAGES REMOVED

WITH THE MANUFACTURERS

Hercules Makes Executive Changes—Bigelow, Milliken and Ellis Advanced

At its regular monthly meeting on July 29, the Board of Directors of Hercules Powder Company elected Charles A. Bigelow a vice president and a member of the Executive Committee. At the same meeting, Mahlon George Milliken, general manager of the Cellulose Products Department, was elected a director; and William Robert Ellis, now assistant general manager of the Explosives Department, was named general manager, taking the place vacated by Mr. Bigelow.

The new vice president came with Hercules Powder Company in June, 1921, when that company purchased the Aetna Explosives Company. At that time Mr. Bigelow was general manager. After the consolidation he was placed in charge of explosives operations and when the Hercules organization was departmentalized in 1928 he became general manager of the Explosives Department.

Mr. Bigelow was born in Schohaine, New York. He was graduated from the University of Vermont, later completing graduate work in chemistry at Harvard. Prior to his connection with Aetna, Mr. Bigelow had extensive general chemical experience as superintendent of several chemical plants.

Mr. Milliken, the new member of the Board of Directors, has been with Hercules since 1915. He was appointed general manager of the Cellulose Products Department in April, 1934.

Graduated from Rutgers University in 1913, Mr. Milliken soon became connected with the nitrocellulose industry through employment at the Parlin, New Jersey, plant of the Union Powder Corporation which Hercules bought in 1915. Mr. Milliken was named assistant superintendent of that plant in 1923, and later became superintendent.

Under Mr. Milliken's direction of the Cellulose Products Department, a number of new materials have been developed for use in various chemical fields.

Since his connection with Hercules on July 1, 1915, the new general manager of Hercules' Explosives Department has served as salesman, technical service expert, assistant manager of the San Francisco office, and assistant general manager of the Explosives Department. The latter appointment was made in May, 1934.

Prior to his employment with Hercules, Mr. Ellis studied mining engineering at Stanford University and worked in mines and on construction projects in California, Arizona, and other states. His service with Hercules throughout the West won him wide recognition in the construction and mining industries.

▼

Gar Wood Appoints Nine New Distributors

W. H. Hammond, Sales Manager of the Hoist and Body Division, Gar Wood Industries, Inc., has announced the recent appointment of the following distributors: Shaw Sales Co., Billings, Mont.; A. Fassnacht & Sons, Chattanooga, Tenn.; Baker Equipment Engineering Co., Charlotte, N. C.; Lone Star Equipment Co., El Paso, Tex.; Mississippi Truck Equipment Co., Inc., Jackson, Miss.; C. W. Rathbun Co., Oklahoma City, Okla.; Allison Steel Manufacturing Co., Phoenix, Ariz.; Felt Auto Parts Co., Salt Lake City, Utah; Union Iron Works, Spokane, Wash.

"Our national business volume at present is greater than that of any other period during the 23 years of the company's operation," Mr. Hammond said. "We believe that the continued success of any company is due to the constant increase of the distribution of its products. That is why we are now adding many new distributors throughout the country. By having distributors in all important business centers, our customers will also receive quicker action and service."

The Hoist and Body Division of Gar Wood Industries, Inc., manufacturers hydraulic hoists and steel dump bodies to fit all types of truck chasses.

B. F. Affleck to Retire from Universal Atlas

B. F. Affleck has announced his retirement effective Sept. 1 as president of the Universal Atlas Cement Co., subsidiary of the United States Steel Corporation, under the Steel Corporation pension plan, to devote his time to his private interests.

He was born in Belleville, Ill., and attended grammar school and night school there and in St. Louis. Beginning at the age of 14 he worked for several years as machinist, stenographer and clerk with various concerns. In 1896 he began as stenographer for the Illinois Steel Co. (now the Carnegie-Illinois Steel Corporation). In 1901 he became Branch Manager at St. Louis of that company's cement department which, in 1906, became a subsidiary of the United States Steel Corporation, and Mr. Affleck became General Sales Manager. In that position he developed an outstanding sales organization and in 1915 was elected President. During his service with the cement company its business grew from 30,000 bbls. to 30,000,000 bbls.

Mr. Affleck was one of the early members of the Portland Cement Association, was largely instrumental in reorganizing it in 1916 along its present lines, following which he served as its president for five years. He was one of the first to realize the value of concrete for roads and streets and was among its first and most persistent advocates. Much of the work of his company, of the Portland Cement Association and of the cement industry for good roads was due to his faith and leadership and by many he is considered the father of concrete roads.

Mr. Affleck is a member of the American Society for Testing Materials, American Iron & Steel Institute, Western Society of Engineers, Chicago Association of Commerce, American Road Builders' Association, United States Chamber of Commerce, Illinois Manufacturers' Association, Art Institute, Field Museum, Chicago Engineers' Club (President in 1916), Union League Club (President in 1928), and Chicago, Mid-day, Arts, Indian Hill and New York Engineers' Clubs.

▼

Blaine S. Smith New President Universal Atlas

Blaine S. Smith, who has just resigned as president of the Pennsylvania-Dixie Cement Corporation, New York, will become president of the Universal Atlas Cement Co., Sept. 1, 1936. Announcement of this was made recently by William A. Irvin, President, United States Steel Corporation. Mr. Smith's headquarters will be in New York and Chicago.

Mr. Smith succeeds B. F. Affleck who has announced his retirement as president of the Universal Atlas Cement Co. under the Steel Corporation's pension plan to devote himself to his private interests. Mr. Smith has been president of the Pennsylvania-Dixie Cement Corporation and subsidiaries for the last eight years and for more than twenty years preceding was connected with the company he will now head.

Following ten years of service in the traffic department of the Chicago & North Western Ry., Mr. Smith joined the Universal Atlas Cement Co. organization in 1908. He started as a salesman and advanced through various positions to that of general sales manager in 1915, in which position he also succeeded Mr. Affleck who became president. In 1926 he was elected vice-president from which position he resigned in 1928 to become president of the Pennsylvania-Dixie Cement Corporation.

Mr. Smith is widely known in the cement industry and in the construction field. He has been active for many years in the Portland Cement Association serving as president in 1925 and 1926. He was also president of the Cement Institute in 1929 and 1930 and is now a member of the board of both organizations.

Mr. Smith is a member of the American Society for Testing Materials, American Concrete Institute, Chamber of Commerce of the United States, National Association of Manufacturers, American Road Builders' Association, Merchants' Association of New York, and of the Metropolitan, Uptown, Pelham Country, Larchmont Yacht and Chicago Athletic Clubs.

Miller Now President Pennsylvania-Dixie Cement Corporation

The Board of Directors of Pennsylvania-Dixie Cement Corporation announce that they have reluctantly accepted the resignation of Blaine S. Smith, who has been President of the corporation since 1928. Mr. Smith will assume the Presidency of Universal Atlas Cement Company as of Sept. 1, 1936.

The announcement carries the information that John A. Miller, formerly Chairman of the Board, has been elected president, and Victor N. Roadstrum has been elected chairman of the Board. George Kilian, who has been acting as secretary and treasurer, has been appointed also as assistant to the president. Additional changes in executive titles are that Walter S. Wing, who is general salesmanager, and W. H. Klein, general operating manager, have been elected vice-presidents and also members of the Board.

Mr. Miller has been actively connected with and well known in the industry for 36 years, first as president of the Dexter Portland Cement Company and the Clinchfield Portland Cement Corporation prior to the formation of Pennsylvania-Dixie, and since then as president and chairman of the board respectively of the Pennsylvania-Dixie Cement Corporation since its organization.

Mr. Roadstrum has been associated with the cement industry for 27 years, and is a director of many other corporations.

Messrs. Wing, Kilian and Klein are well and favorably known in the industry, having been associated with the Pennsylvania-Dixie company since its organization and with the industry for many years prior to coming with Pennsylvania-Dixie.

▼

Cris Berg, Efficiency Expert, Dies

The death of Christian Paulsen Berg, Chicago, on July 4, brings to an untimely end a man who has contributed a lifetime to reduce lost motion, systematize shop practice, and establish scientific management, with the aid of time study and motion analysis surveys. His experience dates back to the day of Frederick W. Taylor and Carl Barth, with whom he was associated in the early days.

The ground work for scientific shop management as it exists today, was largely pioneered by these three men with the help of the Midvale Steel Co., Bethlehem Steel Co., and Link-Belt Co., in whose shops their experimentations were made and their theories put to practice.

"Cris" Berg not only was an outstanding mathematician and exceedingly capable efficiency engineer, but was well liked by those who were fortunate enough to know him. For many years in a severely crippled condition, he was particularly admired for his fortitude and dogged determination to carry-on as if he were in the best of physical condition.

Since 1932 and until his death, which came but four days after leaving his work, Mr. Berg had been in the employ of Link-Belt Co., Chicago, where he is said to have done much in recent years, to further systematize routine in both shop and office.

▼

Schwanhausser Heads Buffalo Chamber of Commerce

Edwin J. Schwanhausser has been elected President of the Buffalo Chamber of Commerce succeeding Smith M. Flickinger. Robert F. Hicks has been elected first vice-president; Harry A. Howard, second vice-president; William C. Baird Hershey, treasurer; Samuel B. Botsford is executive vice-president. President Schwanhausser is manager of the Buffalo Works of Worthington Pump and Machinery Corporation. He received his M.E. degree at Stevens Institute of Technology and is a member of the American Society of Mechanical Engineers. He is chairman of the executive committee of Interallied Foundries of New York State and a member of the State Advisory Council for vocational and apprentice training for the Board of Regents. He is a member of the Buffalo Athletic Club and the Park Country Club.

Smith Appointed Assistant Vice-President of Inland Steel

Inland Steel Co., Chicago, has announced the appointment of Wallace W. Smith as assistant vice-president in charge of the sale of structural shapes, plates, floor plates and steel sheet piling, and of Maurice E. O'Brien as manager of sales, carbon steel bars and billets. Mr. O'Brien will also have charge of sales to manufacturers of agricultural implements. Mr. Smith was educated in engineering at Penn State University, and later taught engineering at the university of Iowa. For many years he was in the engineering and sales division of Riter Conley Co., and was later works manager of the Chicago shops of McClintic-Marshall Co. He has been associated with Inland since 1926, originally in connection with the works fabricating shop. In 1932, he was appointed manager of sales engineering, and associated with steel sheet piling sales. During the past year he has been assistant to A. C. Roeth, who was in charge of the sale of shapes, plates and sheet piling. Mr. O'Brien is a graduate of Northwestern University. During the World War he served in the 166th Aero Squadron in France, and became affiliated with the Illinois Steel Co. in 1920, in whose sales department he served until he came to Inland in 1934.

▼

DeLong Becomes Waukesha President, Fisher Is Vice-President

At the last meeting of the Board of Directors of the Waukesha Motor Co., James E. DeLong, vice president of the company, who succeded H. L. Horning as general manager, was elected president, and James B. Fisher, chief engineer of the company, was elected vice president. The presidency had been vacant since the death of Mr. H. L. Horning on January 4th last. Mr. DeLong's association with the Waukesha Motor Co. dates back 13 years to 1923 when he joined the company as field engineer in the development of the company's products for the oil industry.

Mr. Fisher entered the Engineering Department as chief of design in 1914, and has been connected with the company since that time. His association with the War Industries Board in the design of Class B Liberty Truck Engine brought him distinction as an executive as well as an engineer. He is well known in the profession, having presented numerous professional papers and won recognition as a result of his many inventions applied to Waukesha engines.

▼

Koehring Appoints New Distributors

The Arizona Lumber Co. with headquarters at 9th and Jefferson Sts., Phoenix, Ariz., has been appointed as a distributor for Koehring products, consisting of shovels, cranes, draglines, dumptors, pavers, mixers, mud-jacks and trail-dumps. The State of Arizona has been designated as the territory for the Arizona Lumber Company.

The Dallas territory is now being handled by the Leland Equipment Co. of Texas, 3915 Main St., Dallas, Texas. Mr. Burrows, formerly of Clark & Burrows, remains as an active member, to continue to serve his many friends established during his activity in the Dallas office.

Roanoke Tractor & Equipment Co., 405 Center Ave., N. W., Roanoke, Va., is now serving the Virginia territory. Mr. W. H. McIlhany, well known in this state, will act as manager, in charge of sales of this new Koehring distributor.

▼

Waukesha Motor Offers Employes Group Insurance Plan

The Waukesha Motor Co., Waukesha, Wis., announces the completion of the preliminary arrangements for installing a life insurance plan under the benefits of which every member of the Waukesha organization, totaling nearly 1,600, can receive protection against death at the lowest possible rate. The plan becomes operative, officials said, as soon as the 75 per cent or more have indicated their willingness to join, and for the very nominal fee of 60c per month paid by each participant, a life insurance policy for $1 000 will be issued.

Inland Establishes Chicago District Sales Office

Inland Steel Co., Chicago, announces the establishment of a Chicago District Sales Office with Leon C. Reed as District Sales Manager and Otto G. Neumann as Assistant District Sales Manager. Mr. Reed was born at Ashburnham, Mass., and studied at Kent College of Law in Chicago. He became associated with Inland Steel Company in 1909, starting in the Order Department, working up through the various Departments, being assigned to the Sales Department in 1920. He began calling on the Trade in 1924, handling sales for the State of Indiana and the South Side of Chicago. Mr. Neumann was born in Chicago, and attended the Northwestern University. He was with Scully Steel & Iron for five years, Jones & Laughlin for 11 years, coming with Inland in 1929 in the Sales Department, where he has handled certain territories in Michigan and Ohio.

▼

Roberts Appointed Manager of Milwaukee Branch of FWD

Appointment of Chester J. Roberts as manager of the Milwaukee, Wis., branch of the Four Wheel Drive Auto Co. has been announced by R. H. Schmidt, general sales manager from the company's headquarters at Clintonville, Wis. Roberts has been with the FWD Company since March 25, 1935. For six years he was the manager of the industries and trade promotion divisions of the Milwaukee Association of Commerce. Roberts is an industrial and sales engineer by profession, having spent over ten years in dealing with problems of sales, organization and production in automotive and other types of industries.

▼

Lincoln Appoints Distributors at Salt Lake City

The Lincoln Electric Co., Cleveland, O., announces appointment of Industrial Supply Company as its distributor at Salt Lake City, Utah. This company will maintain a complete supply of Lincoln products including various models of the well known "Shield Arc" welder, a stock of "Fleetweld" and other Lincoln electrodes, a variety of arc welding accessories and various sizes and models of "Linc-Weld" motors.

▼

Fruehauf Trailer Company Takes on New Tank Head

Recently from Kansas City went Lewis H. Thomas to take over new duties as tank-trailer division head at Fruehauf Trailer Company, Detroit. Mr. Thomas goes to Fruehauf with an experience aided by eight years in the engineering and sales departments of Standard Steel Works, Kansas City, large builders of tanks.

▼

Independent Pneumatic Appoints Schultz Manager of Contractor Tool Sales

Harry Schultz has been appointed manager of Contractor Tool Sales for the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, makers of Thor contractors' and mining tools. In his new assignment, which became effective July 1, he will be in charge of sales for the entire country. For the past few years he has represented this company in the Chicago territory.

▼

Conner Mfg. Co. New Distributor for Enduro Steel

Conner Mfg. Co., Louisville, Ky., has been appointed distributor of Enduro Stainless Steel, serving northwestern Kentucky with a complete stock of sheets, according to an announcement by N. J. Clark, vice-president in charge of sales of Republic Steel Corp., Cleveland, O.

▼

C. H. Bull Represents Young on West Coast

The Young Radiator Co., Racine, Wis., has recently appointed C. H. Bull Co., 115 Tenth St., San Francisco, Calif., to handle the sales of Young heavy duty radiators, oil coolers, heat exchangers, and air conditioning equipment on the West Coast. Formerly these products were handled by W. H. Benduhn, now representing the Buda Co. in Dallas, Tex.

New Distributors for Novo

The Nova Engine Co., Lansing, Mich., has appointed the following new distributors:

Borchert-Ingersoll Inc., 2375 University Ave., St. Paul, Minn.; Borchert-Ingersoll Co., 1 East Michigan St., Duluth, Minn.; Garlinghouse Brothers, 2416 East 16th St., Los Angeles, Calif.; General Machinery Co., E. 3500 Block, Riverside Ave., Spokane, Wash; W. N. Herod & Co., 142 N.E. 11th St., Miami, Fla.; J. B. Hunt & Sons, Oddfellow Bldg., Raleigh, N. C.; Lincoln Iron Works, 76 West St., Rutland, Vt.; Perrin, Seamans & Co., Inc., 606 Atlantic Ave., Boston, Mass.; Smith Tractor & Equipment Corp., 212 Coit St., Irvington, N. J.; Virginia Tractor Co., Inc., 1628-30 W. Main St., Richmond, Va.; Waterloo Construction Co., 524 Park Road, Waterloo, Ia.; Western Contractors Supply Co., 14 N. Clinton St., Chicago, Ill.; Wortham Machinery Co., 410 W. 19th St., Cheyenne, Wyo.; The Sawtooth Co., Boise, Idaho; Warren D. Sampson Co., 730 W. Union St., West Springfield, Mass.; Mr. John B. Foley, Jr., 249 Erie Blvd., W., Syracuse, N. Y.; Dakota Equipment Co., Wilson Terminal Bldg., Sioux Falls, S. D.; The Cunningham Machinery Co., Shreveport, La.; Contractors Equipment & Supply Co., Albuquerque, N. M.; Clarkson Hardware Co., Ocala, Fla.

▼

Inland Purchases Milcor

Milcor Steel Co., Milwaukee, Wis., became a completely-owned subsidiary of Inland Steel Co., Chicago, effective July 1, 1936. All of the outstanding stock of the Milcor Company was purchased by the Inland Company for 59,000 shares of the capital stock of Inland Steel Company. No changes will be made in management or operations. The present officers will continue to operate the company as a unit, in line with previous practices. Milcor Steel Co. is a large manufacturer of sheet metal building products, with manufacturing plants at Milwaukee, Wis., and Canton, O., and warehouses at Chicago, Ill., Kansas City, Mo., and La Crosse, Wis.

▼

Traffic Manager Smith 50 Years in Worthington Service

A testimonial luncheon to Harry T. Smith, Traffic Manager of Worthington Pump and Machinery Corporation on the anniversary of 50 years of continuous service with that organization was held at the Newark Athletic Club, Newark, N. J., July 8. Mr. Smith has been with Worthington since 1886, having started with the old Henry R. Worthington Hydraulic Works, then situated in Brooklyn. Mr. Smith is a native of Brooklyn, was educated in its public schools and at Pratt Institute. His headquarters have been, since 1933, at the Corporation's general offices in Harrison, N. J.

▼

William A. Patton Now with C. K. Koontz Equipment Company

William A. Patton, who was formerly connected with the Pennsylvania State Highway Department and later spent considerable time in the contractors' equipment game, has now become associated with the C. K. Koontz Equipment Company, Pittsburgh, Pa., dealers in equipment and supplies for utilities, municipalities and contractors, and he will cover the southwestern portion of western Pennsylvania as well as adjoining counties in West Virginia and Ohio.

▼

Jensen-Byrd Co. Appointed Distributor for Enduro Stainless Steel

Jensen-Byrd Co., Spokane, Wash., has been appointed distributor of Enduro Stainless Steel, according to an announcement by N. J. Clarke, vice-president in charge of sales of Republic Steel Corporation, Cleveland, O.

▼

Chicago Pneumatic Opens New Texas Branch

Chicago Pneumatic Tool Co., New York, announces the opening of a new sales and service branch at 2415 Commerce St., Dallas, Tex. This branch will be in charge of Mr. D. G. Reeder, district manager.

J. L. Praytor Now District Manager for American Hoist

J. L. Praytor has been appointed district manager for the American Hoist & Derrick Co., St. Paul, Minn., representing the company in the south and southeastern section of the country, including the states of Alabama, North and South Carolina, Georgia, Florida, Tennessee and Kentucky and Mississippi. Mr. Praytor was formerly associated with the American Hoist & Derrick Co. over a long period of years and is thoroughly familiar with the "American" line of products. Mr. Praytor's address is 4601 First Ave. No., Birmingham, Ala.

▼

Pennsylvania-Dixie Makes Appointments

The following appointments are announced by Pennsylvania-Dixie Cement Corporation as of August 1: Herbert M. Cross, District Sales Manager, Philadelphia, Pa.; Joseph G. McCabe, Jr., Assistant District Sales Manager, Philadelphia, Pa.. and Ernest F. Stickles, Assistant District Sales Manager, New York, N. Y.

▼

Lincoln Moves Pittsburgh Office to Larger Quarters

The Lincoln Electric Co., Cleveland, O., has moved its Pittsburgh office, formerly at 323 Fourth Ave., to larger quarters at 926 Manchester Blvd., a few minutes' drive from the heart of the city. Personnel includes: F. M. Maichle, District Manager; W. R. Persons and H. E. White, Sales Engineers; and Miss Esther Lee, in charge of the Order Department.

▼

NEW LITERATURE

Tire Load and Pressure Tables—Of interest and day-to-day value to all owners and operators of trucks and buses is the new "Load and Inflation Pressure Tables for Trucks and Buses" just published by the B. F. Goodrich Company, Akron, Ohio, and now available upon request.

Printed in blue ink on heavy white stock, the posters, 14x22 in., list the tire sizes, correct inflation in pounds, and carrying capacity in pounds on all Goodrich truck and bus tires, as well as load and service diagram illustrating the effects of overloading on the service of a pneumatic tire.

Bituminous Distributors and Maintenance Equipment—A handy little folder issued last month by Littleford Brothers, Cincinnati, gives pictures and a brief description of the following items:

Model "C" Distributor—500 to 2000 gal. capacity.
Model "M" Distributor—300 to 1200 gal. capacity.
The LB Trail-O Distributor.
Bituminous Supply Tanks.
Traf-O-Spray for line marking.
Traf-O-Dot buttons.
No. 99 Surface Heater.
No. 90 Tool Heater.
Handeebox—a light weight trailer tool box.
Tar and Asphalt Melting Kettles in the following sizes: 10, 30, 50, 75, 110, 165, 210, 300 and 550 gal. capacity.
No. 101 Utility Sprayer in 300 and 500 gal. sizes.
Nos. 93-AM and 93-OB small emulsion sprayer units.

Guard Rail Equipment—The Wej-Lock Co., Centralia, Mo., has issued a bulletin illustrating and describing its guard fence. This is a single strand fence in which the springs at the ends are stated to absorb shock of contact and to keep the strand taut at all seasons.

Air Compressors—The full line of air compressors of the O.K. Clutch & Machinery Co., Columbia, Pa., are fully described as to design, workmanship and quality, in a recent bulletin. Illustrations and specifications of the various compressors are given and details of their construction are illustrated and described. Ask for Bulletin C-36.

Snow Fence—A catalog illustrating and describing its snow fence has been issued by the New Jersey Fence Co., Burlington, N. J. This fence is a combination of white cedar pickets interwoven with No. 12 gauge heavy galvanized in double wire strands. Four twists between each picket. The pickets are 2 in. wide and about ½ in. thick.

Rock Asphalt Surfaced Playgrounds, Tennis Courts, etc.—A design for playgrounds, tennis, volley ball and basket ball courts surfaced with Kentucky rock asphalt has been published by the Kentucky Rock Asphalt Institute, 719 Marion E. Taylor Building, Louisville, Ky. The design provides for a surfaced playground which can on short notice be connected into courts. Plans have been made for six types of cross section, in order to provide for the use of local materials, where possible, and provide economic advantages in figuring sosts. All are proven satisfactory designs for playgrounds, tennis courts, sidewalks and driveways. All details for installations are covered briefly in the booklet, copies of which can be obtained from the Institute.

Private Driveways.—A pamphlet, "Construction of Private Driveways," has been prepared by the U. S. Bureau of Public Roads, to aid homeowners in planning and improving their homes. The pamphlet contains drawings and photographic illustrations of several varieties of "ribbon" surfaces and full-width surfaces of roadway. Drives of stone, gravel, bituminous material, concrete and brick are described. Tables for rapid estimation of quantities of materials are included.

Drifters, Detachable Bits—The Sullivan Machinery Co., 307 North Michigan Ave., announces the publication of two new bulletins, one in connection with its new line of drifters, the other describing its detachable bit and its advantages, the title of the latter being "Sullivan Writes a New Chapter." These bulletins will be sent on request.

New "Pipe-Line" Aftercooler—A bulletin featuring an aftercooler of new design has recently been released by Ingersoll-Rand Co. This aftercooler is designed to serve air and gas compressors of moderate capacities. The aftercooler is for use in the discharge line in place of a section of the pipe, thereby making discharge pipe and aftercooler a complete unit. Copies of the bulletin (No. 2239) can be obtained from Ingersoll-Rand, 11 Broadway, New York.

Shield for Building Tunnels—An illustrated folder, No. 1591, has been released by Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, describing and giving rather detailed information on the construction and application of the so-called T & M Tunnel Shield for constructing concrete-lined tunnels of 4-ft. to 8-ft. inside diameter, without disturbing the surface.

Road Scraper—An attractive two-color circular has just been issued by the Monarch Road Machinery Co., Grand Rapids, Mich., describing its Monarch hydraulic scraper. Illustrations showing all details of the scraper are given in the folder as well as complete specifications.

Wheels, Hubs and Parts—The new 1936 catalog of the Budd Wheel Co., Detroit, Mich., contains complete information on the Budd single and dual wheels for trucks, bases and trailers. Information is given on their struction and application under various conditions, with various tire sizes.

Building Airports—An 8-page folder issued by R. G. LeTourneau of Peoria, Illinois and Stockton, California, contains an interesting collection of views of LeTourneau equipment in operation in grading and clearing airport sites at widely scattered points throughout this country and Canada. Brief descriptions and explanations are given.

Power Shovel Construction and Operation—"The Ground Hog," periodical publication of the Marion Steam Shovel Co. of Marion, Ohio, contains a most interesting illustrated account of operations within its plant, following which there are several very interesting short articles with pictures, showing these shovels in service on various jobs.

Quarterly Digest of Current Asphalt Literature—A condensed resume of articles on asphalt and asphalt paving appearing in current engineering, trade and official periodicals in the United States, Canada and foreign countries, during April, May and June, 1936, issued by the Asphalt Institute, 801 Second Avenue, New York, N. Y.

Articles reviewed are covered under the following main headings:

1. Asphalt as a material.
2. High type asphaltic pavements.
3. Low cost roads.
4. Subgrades and foundations.
5. Miscellaneous uses.
6. Equipment.
7. Tests and experiments.
8. Important books dealing with asphalt.